

**SURVEY AND UTILISATION
OF AGRICULTURAL AND
INDUSTRIAL BY-PRODUCTS
AND WASTES**



सत्यमेव जयते

**COMMITTEE ON NATURAL RESOURCES
PLANNING COMMISSION
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FOREWORD

Utilisation of wastes of agriculture and forestry and of by-products of industry has received considerable attention in the industrial countries of the West in recent decades. Through appropriate measures for utilisation of these materials, it has been possible to conserve valuable natural resources, reduce costs of production, and also in many cases to solve problems of public health and welfare created by indiscriminate 'dumping' of waste materials or discharging of industrial effluents in rivers and lakes. In India, the subject has not received much attention so far and large quantities of waste materials and by-products are allowed to go unutilised.

This series of studies on utilisation of agricultural and industrial wastes is an attempt to survey the field, and in particular to identify the areas in which measures for utilisation can lead to appreciable improvements in resource utilisation and saving of materials. The series relates to fifteen subjects in the fields of agriculture, animal husbandry and fisheries and manufacturing industries. The studies have been done with the assistance of the concerned specialised agencies of the Government. I hope these studies will help to draw the attention of Government, organised industry, and the general public to this important problem which will grow in magnitude as industrial development proceeds and that recommendations will receive the attention they deserve, and that appropriate programmes of utilisation of wastes will be incorporated in our successive Five Year Plans.

NEW DELHI
August 7, 1963

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PREFACE

The Committee on Natural Resources at its meeting held on 24th December, 1961, approved a study on utilisation of wastes and by-products of agriculture including forestry, animal husbandry, fishery and industrial wastes. The Committee felt that there were large quantities of such wastes which were at present used in an uneconomic manner or left completely unutilised, e.g. husk, straw, corn cobs, non-edible vegetable oilseeds, inferior fibres, nutshells, feathers and bones, sea-weeds, etc. In some of the advanced countries of the world these wastes are usefully exploited and add to the national wealth. Modern advances in science and technology have led to very profitable utilisation of such products, and there is scope for this work in India too.

A Working Group, consisting of representatives of the Ministries of Food and Agriculture, Economic and Defence Coordination, Steel and Heavy Industries, Mines and Fuel, Council of Scientific and Industrial Research and the Planning Commission was constituted. The Working Group was directed to survey the location and availability of waste products, to make a list of various uses to which they may be put in the light of experience of other countries and known technological possibilities and to work out the economics of such utilisation. Where the utilisation was economically feasible, it was to be indicated; where there was need for further research for effective utilisation of wastes, the Group was asked to make recommendations to that effect. In a number of cases information about quantities of waste products is not available and surveys are required.

The Working Group met on 26th March and 28th August, 1962. The basic papers which were prepared by the various institutes and organisations as well as individual experts were revised. The Planning Commission at their meetings held on 2nd May, 27th and 29th June, 1963, approved the studies.

The studies have indicated that most of the waste materials are potential sources of raw materials for various industries. For instance, it has been established that blast furnace slag can be profitably used for the manufacture of cement; protein rich food can be made from sea-weeds; by-products of coal carbonisation can be used in the manufacture of toluene and other organic compounds which are vitally needed by the defence industries; utilisation of minor non-edible oilseeds like *mahua*, *neem*, *karanj*, *undi*,

etc. would go a long way in reducing the rising pressure of demand on other edible oilseeds which are now being used in the soap and cosmetics industry. Full details of the products that can be obtained from various wastes and by-products have been dealt with under each item.

Some of the obstacles in the way of economic exploitation of these wastes and by-products are non-availability of technical guidance to the prospective entrepreneurs, lack of a ready market, and difficulty of collection.

The recommendations arising out of the analysis of each item are given at the end where the agencies responsible for their implementation have also been indicated. These recommendations, it is hoped, would lead to the formulation of specific schemes of survey and utilisation of these wastes and by-products, to be included in the Fourth Plan. Some of the recommendations can be implemented in the Third Plan as they involve neither any foreign exchange nor any major industrial set-up, and it is hoped that they would receive consideration at the hands of implementing agencies. In the end I extend my thanks to the organisations, institutions and specialists who cooperated in this study.

NEW DELHI

August 7, 1963

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Institutions

Central Fuel Research Institute.

Central Building Research Institute.

Indian Lac Research Institute.

Central Institute of Fisheries Technology.

Indian Central Tobacco Committee.

National Chemical Laboratory.

Central Food Technological Research Institute.

Indian Salt and Marine Chemicals Research Institute.

Central Glass and Ceramic Research Institute.