



S. C. Panda

Contingent Planning for Disaster Management



CONTINGENT PLANNING FOR DISASTER MANAGEMENT



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AT THE FEET OF LORD
SHREE JAGANNATH,
PURI, ORISSA

DEDICATED TO MY FATHER,
SHYAM SUNDAR PANDA
AND MOTHER,
SHNEHALATA PANDA



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FOREWORD

*“Success is the ability to go from failure to failure
without losing your enthusiasm”*

Advances in basic sciences such as chemistry, physics, biology and genetics have helped in understanding the factors affecting growth of plants and to increase the production processes in agriculture. Fertilizers, pesticides, new varieties and hybrids of crops and methods of cultivation are largely the offspring of science. Scientific agriculture played an important role in the process of enrichment of developed countries. If development is to occur in the developing countries, agriculture must be able to produce surplus food and exportable commercial crops on cost-effective basis. Any country seeking to develop its economy has to give significant priority to agriculture, particularly scientific agriculture. Wherever scientific methods are applied, experience world over shows they got agriculture revolutionized.

Although agriculture is intimately related to weather, not many integrated academic studies on the subject have been made till today. The blame may be placed on the traditional system of education, in which agriculture and the science of weather remained self-contained disciplines. Agricultural scientists have been aware of the effects of weather on the various aspects of agriculture, but they did little to understand and highlight these effects. In fact, agricultural scientists focused their whole attention on the tapping of soil resource and cared little to understand climate even as a resource in agriculture. They have been of the view that the studies on the crop-weather relationship are of little practical value as compared with the knowledge of soil potentials. Scientists in meteorology on the other hand, concentrated their attention on the measurement of atmosphere and on giving mathematical expressions to the various phenomena occurring in the atmosphere. They did little to bring out the importance and usefulness of their findings to agriculture.

Students of agricultural science play the important role in the department of agriculture as agriculture is the backbone of our country. **The need for comprehensive information on the Agricultural meteorology, Disasters Management and Contingent Crop planning for sustainable crop production relevant to Indian conditions has been felt for quite some time.** The text-cum-reference book to meet precisely the felt need is an outcome of the author's active involvement in teaching, research and extension guidance in the field of agronomy for over thirty years.

The author presented the book entitled, **“Contingent Planning for Disaster Management”** in a scientific and systematic manner to understand the fundamentals clearly and easily which is the beauty of this book. Potential yield can only be achieved under

ideal management in an optimal physical, chemical and biological environment. Farming Systems represent integration of farm enterprises as cropping systems, animal husbandry, fisheries, poultry farming, etc. for optimal utilization of resources bringing prosperity to the farmers. A judicious mix of cropping systems with associated enterprises like dairy, poultry, piggery, fishery, sericulture, etc. suited to the given agro-climatic conditions and socio-economic status of farmers would bring prosperity to the farmer.

Concern about environmental safety and sustainability of land productivity is increasing among scientists, administrators and environmentalists. With the increasing population, it is also becoming clear that food security to the teeming millions will not be possible unless the available resources are efficiently utilized for increasing the productivity.

Remote sensing is a multidisciplinary science dealing with the collection of the information on natural resources from distances using electromagnetic energy. The principles involved in the process are interaction of radiation with the matter and their surface. Different techniques and technologies have been developed to collect the information and their interpretation. In this fast changing environmental conditions and degradation accurate information on environmental resources is essential. This can be achieved through remote sensing satellites. This book brings out the principles and techniques employed in agriculture.

Contingent crop planning is highly essential for the adverse effects on farming operations and crops. The adverse effect of the dry weather on crops and farm operations are manifold. The severity of effects varies from district to district based on the amount of precipitation received and its distribution. However, general pattern of effects is listed like. 1. Timely land preparation could not be done, 2. In completing seedling- Sowing could not be completed in considerable portion of upland, medium land and low land, 3. Delayed weeding and inter-culture which could not be done due to unfavourable soil condition. 4. Death of germinating seeds in directed seeded crop resulting in sparse plant stand, 5. Death of seedlings in nursery are found and 6. Delayed transplanting – transplanting of rice could not be started in many areas or the progress has been very low.

It is well known that the ability of society to cope with floods and droughts lies in effective coordination among meteorologists, hydrologists, agricultural experts, foresters, ecologists, information scientists, administrators, managers, and above all, the affected people themselves. It is also the ability to forecast, to communicate quickly and to act on that information rationally. This, in essence, is the systems approach to the problem.

In the poly houses, in addition to growing different crops during the off season, grafts, seedlings, and suckers of different crops can also be produced. Poly houses provide immense scope to further the cause of horticulture and floriculture. In western cold counties, cultivation of vegetables and flowers in glass houses and plastic houses has come commercial and these are good competitors in general agriculture. In the fields also with plastic mulching the season of cultivation of crops like maize, tomato, potato, cotton and cole crops can be advanced and fetch early market high price. **Plastic mulching** increases soil temperature, conserves moisture, reduces irrigation requirement and weed competition.

Agroforestry has gained popularity among farmers, researchers, policy makers and other for its ability to contribute significantly in meeting deficit of tree products, socio-economic and environmental benefits. Agroforestry is a land use option that increase livelihood security and reduce vulnerability to climate and environmental change. According to Planning Commission report **“Greening India”** that 33% forest cover can only be achieved through agroforestry. The Prime Minister released India’s National Action Plan on **“Climate Change”** recently and The National Action Plan focuses attention on 8 priority National Missions in which Greening India and sustainable agriculture having close relation

with agroforestry in agriculture, agronomy as sub-discipline deals with multiple cropping (intercropping, mixed cropping, sequential cropping), soil management, crop production and all the ways in which soils and crops interact and also interfaces between two species. In Agronomy, mixed cropping might be considered to be similar to that of agri-silviculture, which is one of the systems of agroforestry. Agroforestry as a multidisciplinary approach needs agronomist, soil scientist, forester, plant physiologist, economist, extension, social scientist and others to undertake research on its various aspects. The basic principles of agronomy are also applicable in agroforestry research and agroforestry is a complex system than other fields of agriculture.

It is important for the teachers to process the mass of information and make it available to the students in an early understandable manner. The information provided should not only be simple to understand but also to comprehend in an integrated manner. The book is intended to introduce the students of various disciplines to the subject of Agro-meteorology and to make them realize the importance of weather to weather to agriculture.

I am confident that this book will serve as a text book for Agronomy, Agricultural Meteorology, Agriculture Engineering, Soil Science and Veterinary students, a reference for research scientists and teachers in the areas of agro-meteorology, crop production, integrated farming systems, dry land agriculture, cropping systems, production technology management under different situations, soil fertility management, avian and animal sciences. This book will also serve as a guide to the extension officials of the department of agriculture. I congratulate Dr. S. C. Panda for his pains taking effort in bringing out this book covering the latest technologies for crop production associated with integrated enterprises in farming systems to meet the growing interest in sustainable agriculture. I am confident that this book will be widely accepted among the students. I extend my best wishes to Dr. Sharat Chandra Panda for the success of this book.

Bhubaneswar.



Dr. Bhagabat Panda

PREFACE

“Butterfly keeps flying from one flower to another in search of nectar without losing enthusiasm. Similarly one should never lose enthusiasm as it is the only force, which drives people to perform at their best and allows them to achieve the worthiest of causes”

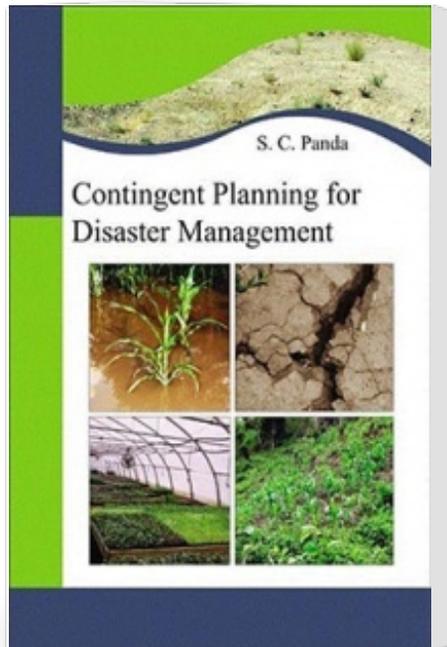
Concern about **environmental safety and sustainability of land productivity** is increasing among scientists, administrators and environmentalists. With the increasing population, it is also becoming clear that food security to the teeming millions will not be possible unless the available resources are efficiently utilized for increasing the productivity. The strategy adopted during the green revolution era can not be valid anymore under the prevailing conditions. A new strategy of living with the nature and nurturing it for sustainable high productivity should be evolved. Though use of chemical inputs can not be altogether avoided, their use in agriculture has to be rationalized. Organic agriculture shows us the way to effectively use the available natural resources for the benefit of the mankind.

The recycling of various forms of residues has the advantage of converting the surplus farm waste into useful product for meeting nutrient requirement of crops, besides maintaining the soil condition and improving the overall **ecological balance**. As most of the plant nutrients are required by animals and human beings alike, a nutritional continuance exists between soil, plant, plants, animals and human beings. If regulated properly, enormous losses and leakages take place and substantial amount of nutrients which could have been utilized, are wasted. **Resource conservation** and their regulated recycling for production is the option for sustained living.

It is now fully-realized that except climate, all resources in **crop production** can be exploited to a limited extent. A fuller exploitation of the weather resources, therefore, is the major hope in greater production to meet the demands of the staggering increase in population. It has been demonstrated that, apart from weather forecasting, which solves a number of our daily problems, meteorology, has very useful application to various agricultural activities, such as the selection of crop-production sites, irrigation control, soil and water conservation, the amelioration of field climate and the adoption of the best-fitted agronomic and cultural practices in crop production.

The increasing utility of agro-meteorology, together with an integrated approach of the scientists of different disciplines during the last four decades has greatly contributed to the development of this field into a broad based inter-disciplinary subject. Micro-meteorologists and Biologists have conspicuously contributed to the development of this subject, the former

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