

# Field Manual for Weed Ecology and Herbicidal Research

R. A. RAJU



**Field Manual For  
Weed Ecology  
And  
Herbicidal Research**

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## **FOREWORD**

The over populated developing nations of Asia and Africa need more and more food production to meet their over growing needs. Weeds are one of the limiting factors of food production in these countries ever since organised agriculture came into practice. The hoe and the plough which became symbols of our ancient civilization also served the purpose of reducing the weed menace.

The recent new dwarf crop plant types coupled with intensive cropping systems, modified the crop eco-system, favouring prolific weed growth. To control the weed menace a number of strategies have to be developed.

Weed Science is a relatively new subject. It is necessary to develop programmes of research and education, and also trained and qualified manpower. Teaching and research on weed control in Agricultural universities is still in infant stage. Weed Science is a multi-disciplinary subject encompassing Agronomy, Botany, Ecology, Toxicology, Bio-chemistry, Statistics etc., and the modern weed scientist should have knowledge and experience in these areas to be able to handle weeds effectively.

This manual prepared by Dr. R.A Raju should be useful to both researchers, extension workers and student community. The author has painstakingly incorporated relevant topics to meet the felt need of all those who are dealing with weeds and it has chapters on weed ecology research, techniques of field experimentation, qualitative and quantitative assessment of herbicidal effectivity, spraying techniques, reporting of data etc. I hope the manual will be widely consulted by all.

I congratulate the author for bringing out this Manual.

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## P R E F A C E

For sustainable and stable economic growth of any country the need to raise the agricultural production can not be overemphasised. With the help of sophisticated farm technology, the agricultural production is increasing but much of it is being lost at many stages. The first stage can be the onslaught of weeds on the tender crop seedlings as soon as they emerge from the soil. These weeds plunder the nutrients, water and other vital growth requirements and reduce the crop yields as much as 60 percent. The involvement of heavy fertilisation resulted in prolific weed growth. If these weeds are not controlled, the purpose of high yielding technology gets defeated.

In ancient sanskrit literature there is a vivid description of vegetation and other flora as related to the environment. Some greek philosophers such as Theophrastus (300 BC) also gave the ecological relationship of weed flora in their writings. However the phenomena was based on hypothesis but not tested experimentally. Weed ecology is the most exciting field of the scientists today. Working with techniques adapted from different allied subjects, weed scientist begun to unravel the secrets of weed ecosystem. Agronomists and botanists have begun to join hands to give a worthwhile ecological shape to study the weeds and their nature. Scientific endeavors in the field of weed ecology helps in understanding the sociology of weeds and provide a route to the satisfactory weed control. In the last few years, most of the universities have realised the fact and introduced the subject at post graduate level. At this juncture, teachers and taught felt the greatest necessity of a book which could introduce the methodology of weed ecological

research on modern lines.

The excitement of research on the control of weeds had its impact on the teaching of weed science in the universities. Scientists and publishers strove to modernise their text books to emphasize the discoveries made in chemical control. The result was a serious imbalance in the way in which the weed science were presented to students and researchers. Many students know more about hundreds of chemicals than they know about the functioning of weed ecosystem. The scientific problems involved in them are still much larger than the progress that has been made in solving them.

Like any developing sciences weed control will continue maturing only as its practitioners expand and refine their research technology. More screening of chemicals for weed control in various crops is no longer sufficient. The safety of soil, atmosphere and preservation of ecological balance is necessary through collecting extensive data concerning herbicidal residues in soils and crops and shifting of weed flora. There is a need to provide flexible guidelines for successfully carrying out the crucial field segment of weed control experimentation.

As a researcher and organizer of field trials in weed control, I have felt the necessity of a book which will give a fairly comprehensive account of the basic procedures of field experimentation so that research workers and students develop a clearer understanding and proper perspective. The tools and techniques in weed control research is rapidly changing day by day. Informations are not readily available in a concise form to many who are interested in the subject. This situation has been faced by me when I started research in weed control and this has prompted me to write this book which is primarily intended to meet the requirements of young researchers.

In writing this book I have had number of aims in mind. The book is designed solely for those intended to have a career as professional weed scientists. I tried to cover all practical methods used in

weed research which require understanding by research workers and students as well. The effort is worthwhile if the book fulfills the aim. No work is perfect in the universe. The author nonetheless, assumes full responsibility on errors and short comings that might have remained. I hope that the readers could bear with them and communicate the defects so that I can bring out a better editions in future.

A book in such a diversified subject can never be one man's work. besides his own observations, readings and research work around the world the author fully used. Information and assistance were received from a number of sources to which the author acknowledge his deep appreciation. I also acknowledge the generous support given by Dr. K. Moody, IRRI, Philippines. The author is indebted to the various publishers and authors of books and journals from which he has freely drawn the matter in the text. In case, if it is not possible to contact, the author offer his sincere apologies.

The mental freedom which I needed have been generously given by my family members, due to which only I could complete this book in time. To my wife, Lakshmi, I have a special word of praise for her buoyancy and patience during the long periods of my work on this book. I was fortunate in securing the talented services of Mrs. Uma Rani and Mrs. Sitaparvati who drew fabulous illustrations for the text. I am thankful to my sister-in-law, Mrs. Parvati who took all my burden on her shoulders during literature review.

I trust that the readers enjoy to go through the book as much as I did writing for them and hope that it will help them in conducting a better research. I humbly conclude with the following quotation of Jacob Bronowski *"It is not the business of science to acquire the earth from ancestors, but to inherit the moral imagination, because without that human being, his beliefs and scientific attitude will perish together"*.

**R.A. Raju**

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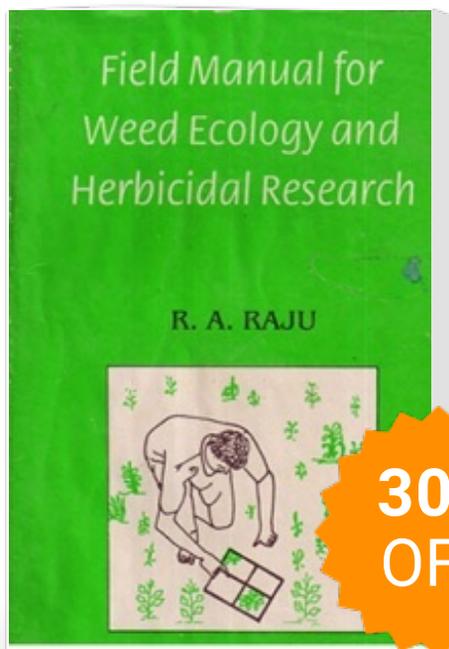
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