

# FARMING SYSTEMS

## Issues and Strategies

The present book is the outcome of valuable scientific contribution made by various scientists across the country. This Book has comprehensive coverage of all the issues and strategies related to farming systems and is expected to provide valuable information for research scholars, undergraduate and post graduate students having farming systems course in their curriculum, guide to entrepreneurs, farming community and NGOs. This book contains thirty eight chapters with broad heads covering i) Overview, issue and strategies of farming system research in India ii) IFS based crop diversification, enterprise selection and planning iii) Food and fodder production strategies based on farmers resource base iv) Integrated resource management v) climate change, carbon sequestration and Agroforestry strategies vi) watershed based approach, soil and moisture conservation strategies vii) IPM and weed management strategies in IFS viii) animal health, dairy farming, integrated goat, poultry and fish management through waste recycling ix) post harvest management of crop residues x) Socio-economic issues and analysis. This book is expected to provide sound knowledge in scientific forum for formulating research plan and policies in the country for making our agriculture sustainable.



**SATISH SERIAL PUBLISHING HOUSE**

403, Express Tower, Commercial Complex, Azadpur, Delhi - 110033 (India)  
Phone : 011-27672852, Fax : 91-11-27672046  
E-mail : info@satishserial.com, hkjain1975@yahoo.com  
Website : www.satishserial.com



Rs : 4450 00

# FARMING SYSTEMS

## Issues and Strategies



M. M. Das  
P. K. Ghosh



# FARMING SYSTEMS

## Issues and Strategies



Sunil Kumar  
D. R. Palsaniya  
T. Kiran Kumar  
A. K. Dixit  
M. M. Das  
P. K. Ghosh

---

## Farming Systems: Issues and Strategies

---

**Dr. Sunil Kumar**

Head, Crop Production Division

**Dr. D. R. Palsaniya**

Sr. Scientist, Agronomy

**Dr. T. Kiran Kumar**

Scientist, Agronomy

**Dr. A. K. Dixit**

Sr. Scientist, Agronomy

**Dr. M. M. Das**

Principal Scientist, Animal Nutrition

**Dr. P. K. Ghosh**

Director

---

**ICAR - Indian Grassland & Fodder Research Institute**  
Jhansi-284 003 (U.P.), India



**SATISH SERIAL PUBLISHING HOUSE**

403, Express Tower, Commercial Complex

Azadpur, Delhi-110033 (India)

Phone : 011-27672852, Fax : 91-11-27672046

e-mail : [info@satishserial.com](mailto:info@satishserial.com), [hkjain1975@yahoo.com](mailto:hkjain1975@yahoo.com)

Website : [www.satishserial.com](http://www.satishserial.com)

## Contents

---

<i>Preface</i> .....	<i>v</i>
1 Farming System Research in India : An Overview .....	1
<i>U.K. Behera</i>	
2 Sustaining Indian Agriculture through IFS based Diversification: Issues and Strategies .....	17
<i>R.V. Kumar, H.V. Singh and D. Deb</i>	
3 SWOT Analysis of Farming System Research in India .....	33
<i>Sunil Kumar, G. Prabhu and P.K. Ghosh</i>	
4 Enterprise Selection in Integrated Farming Systems: Issues and Strategies .....	43
<i>D.R. Palsaniya</i>	
5 Vegetable Production Strategies in IFS for Profitability and Nutritional Security .....	53
<i>Sunil Kumar and Vikas Kumar</i>	
6 Fodder Production Strategies for Integrated Farming System under Irrigated Conditions .....	65
<i>T. Kiran Kumar, D.R. Palsaniya, A.K. Dixit, G. Prabhu and Manoj Chaudhary</i>	
7 Fodder Production Strategies from Perennial Systems for IFS under Rainfed Conditions .....	85
<i>S.N. Ram</i>	
8 Forage Production Strategies in IFS to Match with the Farmer's Resource Base .....	99
<i>Inder Dev, Asha Ram, Madhulika Srivastava, Mahendra Singh and Rupali Tiwari</i>	

9	Integrated Dairy Farming System .....	115
	<i>B.P. Kushwaha and S.B. Maity</i>	
10	Animal Health and Infertility Management Issues and Strategies under Integrated Farming System .....	121
	<i>K.K. Singh and S.B. Maity</i>	
11	Integrated Goat Production Strategies for Farming Systems .....	141
	<i>S.K. Mahanta</i>	
12	Poultry Production and Management under Integrated Farming System .....	159
	<i>Kalyan Sundar Das, S. Bindu Madhuri and N. Das</i>	
13	Integrated Fish Production and Management .....	173
	<i>M.M. Das, G.H. Pailan, S.B. Maity and K.K. Singh</i>	
14	Integration and Management of Beekeeping in Farming Systems .....	197
	<i>N.K. Shah</i>	
15	Quality Seed Production Issues and Strategies for Integrated Farming System (IFS) .....	209
	<i>D. Vijay, D.R. Malviya, A. Maity, C.K. Gupta and V.K. Wasnik</i>	
16	Resource Conservation Technologies for Sustainable Agriculture .....	227
	<i>A.K. Dixit and T. Kiran Kumar</i>	
17	Balanced Plant Nutrition for Quality Fodder and Milk Production .....	235
	<i>SB Tripathi and AK Dixit</i>	
18	Weed Management Practices for Integrated Farming Systems .....	255
	<i>G. Prabhu, R. Srinivasan, Manoj Chaudhary, Kiran Kumar, C. Sarathambal and G.K. Sujayanand</i>	

19	IPM in Different Field and Horticultural Crops under Integrated Farming Systems .....	275
	<i>N.K. Shah</i>	
20	Disease Management in Different Field and Horticultural Crops under IFS: Issues and Strategies .....	287
	<i>H.V. Singh and D. Deb</i>	
21	Post Harvest Processing and Value Addition of Horticultural Produce in IFS for Higher Profitability .....	299
	<i>Sadhna Pandey</i>	
22	Post Harvest Management of Forage Crops and Crop Residues .....	313
	<i>P.N. Dwivedi and P.K. Pathak</i>	
23	Dung Management Strategies for Integrated Farming System .....	323
	<i>S.B. Maity, K.K. Singh and M.M. Das</i>	
24	Biomass Recycling and Composting in Livestock based Integrated Farming System .....	339
	<i>Shiva Dhar, R.K. Paltā and J.P. Singh</i>	
25	Soil and Water Conservation Strategies in Farming Systems .....	357
	<i>D.R. Palsaniya, Akram Ahmed, T. Kiran Kumar and S.K. Rai</i>	
26	Watershed Based Integrated Approach for Resource Conservation and Livelihood Security .....	375
	<i>S.P. Tiwari</i>	
27	Agroforestry for Livestock Based Farming System: Planning and Management .....	393
	<i>S.K. Dhyani</i>	
28	Agroforestry Approaches for Enhancing Soil Fertility in Farming Systems .....	423
	<i>Ram Newaj, S.B. Chavan, Uthappa, A.R.</i>	

29	Integrated Farming System Research under Climate Change Scenario .....	437
	<i>R.K. Agrawal and J.B. Singh</i>	
30	Assessment and Mitigation of Greenhouse Gases in Integrated Farming Systems .....	445
	<i>R.S. Yadav, N.K. Jat, A. Kumar and T. Ram</i>	
31	Role of Plant Growth Regulators in Integrated Farming System .....	455
	<i>C.K. Gupta, D. Vijay, A. Maity and V.K. Wasnik</i>	
32	Participatory Rural Appraisal (PRA) for Socio-economic Analysis .....	469
	<i>Purushottam Sharma</i>	
33	Gender Issues in Integrated Farming Systems Development .....	489
	<i>Manju Suman</i>	
34	Indigenous Technical Knowledge (ITK) and Environment-friendly Technologies for IFS .....	501
	<i>R.P. Dwivedi</i>	
35	ICT Readiness of Stakeholders for Sustainable Integrated Farming Systems .....	521
	<i>Dr. Satyapriya</i>	
36	Role of NGOs/PPP in Farming System Research and Development .....	537
	<i>Dr. S.N. Pandey</i>	
37	Application of Nanotechnology for Conservation of Resources in Agriculture .....	545
	<i>A. Maity, R. Srinivasan, D. Vijay, M. Srivastava, K.K. Singh, C.K. Gupta, M. Chaudhary and A. Radhakrishna</i>	
38	Greenhouse Technology to Enhance Productivity of Fruits and Vegetables for Small and Marginal Farmers .....	559
	<i>Sanjay Kumar Singh, P.K. Pathak, C.S. Sahay and Akram Ahmed</i>	

## Chapter 1

## Farming System Research in India: An Overview

U.K. BEHERA

ICAR - Indian Agricultural Research Institute, New Delhi-110012

### Introduction

India is basically an agrarian country with more than 60% population relying on agriculture. Today, India has 1.25 billion people. Ensuing food, nutritional and income security for such a huge population under depleting and degrading natural resources is the tough challenge before the scientist, farmers and policy makers. To make the country self-sufficient in food and nutrition, systematic agricultural research started during 1950. India's agricultural production increased by 5-folds but at the cost of degradation of natural resources. The after effects of green revolution for example are not unknown to the scientists and the government. Also, the agricultural development occurred in well endowed regions and small and marginal farmers got bypassed or were less benefited. Thus to meet the multiple objectives of poverty reduction, food and nutritional security, competitiveness and sustainability, several researchers have recommended the farming systems approach to agricultural research and development. Farming systems research is considered as a powerful tool for natural and human resource management in developing countries including India. This is a multidisciplinary whole-farm approach and very effective in solving the problems of small and marginal farmers. The approach aims at increasing income and employment from small-holdings by integrating various farm enterprises and recycling crop residues and by-products within the farm itself (Behera and Mahapatra, 1999; Singh *et al.*, 2006; Mahapatra, 1994).

In India more than 80% farmers are small and marginal which are hardly economically viable under existing technological scenario.