

稻作诊断

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内 容 提 要

本书系统地介绍了稻作诊断概况,稻作诊断的原理,水稻生育期和产量诊断与预测,高产群体诊断,水稻缺素与环境污染、气象灾害、主要病虫害诊断,以及水稻生育阶段看苗综合诊断等高产稻作诊断技术体系。书中附有稻作各类苗诊断彩色插图8面,书末,附有种子、农药、几种肥料的标准等内容。

本书理论联系实际,具有科学性和可操作性,可以作为高产、超高产、优质、安全稻米生产技术培训的参考教材,也可供农业科研人员、农业院校师生、农技推广人员和广大稻农在科研、推广和生产中参考。

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序

民以食为天,解决十几亿人的吃饭问题,是我国一件头等大事。水稻是我国重要的粮食作物,具有高产、稳产和广泛的适应性,种植面积仅次于小麦,但其产量接近全国粮食作物总产的一半,全国有 60% 以上的人口以稻米为主食。因此,水稻生产在我国农业及国民经济中占有举足轻重的地位。

近几十年来,随着生产条件的改善,品种生产力的提高,肥料、农药投入的增加和栽培技术的改进等,水稻单产有所提高,对减缓粮食压力起到了重要作用。但是,我国人多地少,人口增加,人均耕地面积减少,农业结构的调整,是影响粮食作物发展的长期制约因素。因此,提高稻米的单产是解决我国粮食安全的根本出路。水稻高产是我国农业发展的永恒主题。提高水稻单产是一项综合措施,要靠良种靠良法。良种是内因,永远是一个重要的因素,但良种的充分发挥,必须通过科学栽培来实现。

水稻科学栽培的内容包括三个方面:一是水稻生育进程中器官建成和产量因素形成规律,二是水稻高产群体形成过程中的生育、形态、生理指标,三是各种栽培技术措施的调节效应。

栽培的目的是培育高产群体,应用的各种技术措施是通过调节正在生长着器官的形成和生长来影响群体;反之,由诊断群体优劣为正确运用栽培技术措施提供依据,以确保水稻群体朝着健康和高产方向发展,所以,从这个意义上讲,水稻栽培的实质是看苗诊断。稻作诊断技术是在水稻高产栽培中发展起来,是水稻高产稳产的保证。因此,研究和应用“稻作诊断技术”对持续高产具有重要意义。

长期以来,笔者在各地生产单位进行水稻苗情和生理病害的“出诊”、“门诊”以及教学活动中,深感水稻在其生育过程中,遭受到不良环境和营养不足或栽培不当,所形成的各种长相(形态)或引起各种的危害。若能及时诊断各类苗情或危害的原因,提供正确的转化措施和防治方法,对水稻高产稳产、优质、安全生产有着极为重要的作用。深入农村田头进行“稻作诊断”深受稻农和学生的欢迎。水稻生产和教学上的迫切需要,鞭策我们编写本书,目的是为广大基层农业科技推广工作者提供稻作诊断及其防治与转化措施的依据,也为广大稻农和农业院校师生在生产实践中参考。

《稻作诊断》一书是笔者在近 30 多年科学研究和水稻看苗诊断实践基础上,广泛收集这一领域的研究成果和各地实践验证资料编著而成。本书系统地介绍稻作诊断概况,水稻诊断的原理,水稻生育时期,水稻群体动态,产量诊断,水稻缺素与环境污染诊断,水稻气象灾害、主要病虫害诊断,以及水稻各生育阶

段看苗综合诊断及其转化技术等内容,书中附有稻作各类苗彩色插图,种子、农药资料和几种肥料的标准等有关参考资料,以供查考。

本书坚持科学性,具有较高的学术水平和实用价值,图文并茂,紧密联系实际,直接为生产服务,有较强的可操作性。它的出版将对全面提高稻作技术水平,增加水稻单产,实现农业可持续发展有重要价值。相信本书的出版定会得到广大读者的喜爱。

本书在编写过程中得到了扬州大学农学院、常熟市和吴江市农林局等单位的关心和支持,参阅了诸多作者的有关资料,在此表示衷心感谢。由于稻作诊断涉及水稻生理、栽培、土壤、肥料、气象、植保、环保等多方面因子,知识面甚广,限于编著者水平,错误之处在所难免,恳请广大读者和同仁批评指正。

编 著 者

2006年10月

PREFACE

The life of people is based on food. It is the first priority in China to feed more than one billion people. Rice (*Oryza sativa* L.) is the first food crop in our country, which has the characteristics of high-yielding, stable yield and extensive adaptability. Rice is second only to wheat in terms of cultivation area, and its output is close to one third of entire national food crop output, providing staple food for more than 60 percent of the total population of China. So rice production has been playing more and more important role in national agriculture and economy.

Over the last several decades, with the increased productivity potential of varieties, enhanced pesticide and fertilizer application and improvement of cultivation techniques, the rice productivity per unit area increased progressively, which has played an important role in easing the food pressure of China. However, China has a large population with less cultivated land. As a result, improvement of per unit yield of rice is critical to resolve the issue of Chinese food security. High-yielding of rice is forever theme of Chinese agricultural development. High yield of rice is achieved by a comprehensive measure, including both good varieties and fine culture practices. Good varieties belong to intramural reason, however, in order to realize their full potential, fine varieties must integrate with scientific cultural techniques.

The contents of rice scientific cultivation include three aspects: firstly, the regulations of organ growth and yield formation during rice development;

secondly, Index of development, morphology, and physiology in the course of high yield population formation; thirdly, impacts of various cultivation measures. The objective of cultivation is to achieve high-yielding population, and various technical measures influence the rice population though adjusting growth and development of different organs. Only based on sound population diagnosis, can we correctly use various cultural measures, which in turn make rice population develop towards healthy and productive direction. In this sense, seedling diagnosis is the essential of rice cultivation. Rice diagnosis techniques, which developed from the practices on high-yielding cultivation, could ensure the high and stable yield of rice. So the research and application of rice diagnostic techniques have important implication for achieving high and stable yield of rice.

During the long periods of our practices on seedling situation and disease diagnosis for various local production units, we found that, in the course of rice developmental process, when rice plants are subjected to bad environment exposure, poor nutrient or improper cultivation measures, various damage symptoms will be emerged. So in order to stable rice yield, it is very important to timely and correctly diagnosis various seedling symptoms and find relevant solutions. Rice diagnosis in field is welcomed warmly by rice farmer, as well as the college students. Exigent needs on rice production and teaching encouraged us to work on this book. The objective of the book is to provide a reference for rice diagnosis and suggested solutions.

This written book, diagnosis of rice crops, is based on scientific research and diagnosis practices during the recent three decades. We also collected a large amount of information on featured research results within this domain, together with practical experiences from different places across China. This book systematically introduces the general survey and progress of rice crop diagnosis, rice yield formation and various contradictions that exist during rice growth and development, organ morphology and simultaneous relationship among organs, growth stages, rice population dynamics, yield diagnosis, diagnosis for lacking element rice plants and environmental pollution,

diagnosis of meteorologic disaster and main diseases and pests, as well as comprehensive diagnosis during the different growth stages of rice and technology transform. There with color photographs of different types of seedling, the criterions of seed, pesticide, main fertilizer, and pertinent references attached at the end of this book.

The book has higher academic level and practical value. Its publication has significant implications for improving technology of rice farmer, enhancing per unit yield of rice and achieving sustainable development of agriculture.

In the process of writing, this book has been concerned and aided by griculture and forestry bureau of ChangShu and WuJiang and agricultural college, Yangzhou University; here we acknowledge them for their contribution to this book. Because the rice crop diagnosis is related to the multi-discipline knowledge, such as rice physiology, cultivation, soil, fertilizer, meteorology, plant protection and environment protection. Due to limited ability of the author, perhaps a lot of week points would exist in the book, therefore, comments, criticism and suggestions are heartly welcome from the readers and fellow workers.

The Authors
2006.10

一、自然灾害造成的危害



□ 风害倒伏症状

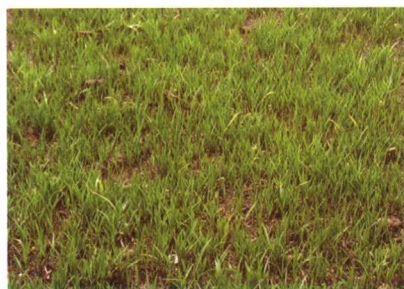


□ 分蘖期苗受涝症状 (2006)

二、水稻苗期症状



□ 烂秧苗 (陶荣祥等, 2006)



□ 水稻死苗田间症状



□ 青枯苗



□ 过密苗
(单株4叶1心)



□ 黄枯苗



□ 水稻盐碱苗



□ 施肥不当引起的局部烧苗



□ 施肥过多引起的烧苗



□ 湿润育秧施用未腐熟有机肥引起烧苗

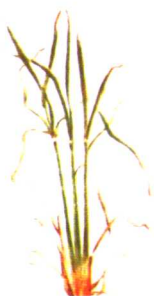
三、分蘖期症状



□ 稻蓟马危害苗 (陶荣祥等, 2006)



□ 冻害引起的白化苗症状图



□ 水稻盐(碱)害症状



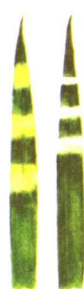
□ 植伤苗



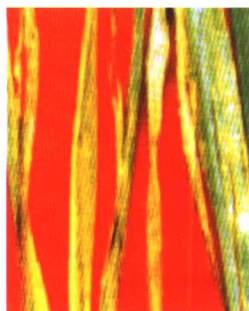
□ 水稻酸害症状



□ 水稻葱管状叶



□ 冷僵型秧苗叶片症状



□ 霜霉病危害症状
(陶荣祥等, 2006)



□ 叶片有溅水滴肥料



□ 田间无水层碳酸氢铵
危害状

四、抽穗成熟期症状



□ 植株贪青症状



□ 植株翘穗症状



□ 杂草稻症状



□ 大青棵症状



□ 水稻恶苗病田间症状



□ 水稻胡麻斑病田间症状