

**STRESS PHYSIOLOGY
IN COTTON**

THE COTTON FOUNDATION

Reference Book Series

The Cotton Foundation was created in 1955 to foster research and education for the cotton industry. Supported by membership dues and grants from agribusiness firms, the Foundation plays an integral role in focusing attention to high priority research and education needs. Foundation members include the world's finest manufactures and suppliers of cotton machinery, plant health products, transgenic technologies, planting seed, testing instruments, processing materials; and consulting, financial and communications services

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We are pleased to publish ***STRESS PHYSIOLOGY IN COTTON***, the seventh in the series of cotton reference books. The first volume, ***COTTON PHYSIOLOGY*** was published in 1986; the second, ***WEEDS OF COTTON: Characterization and Control*** was published in 1992; the third, ***COTTON INSECTS AND MITES: Characterizations and Management***, was published in 1996; the fourth volume, ***VEGETABLE OILS AND AGROCHEMICALS*** became available in 1994; the fifth volume, ***COTTON HARVEST MANAGEMENT: Use and Influence of Harvest Aids*** and the sixth volume, ***BOLL WEEVIL ERADICATION IN THE UNITED STATES THROUGH 1999*** were both published in 2001.

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Delivering innovation to the farm starts with research and development. This year Monsanto invested more than \$1 billion to develop the most robust pipeline of products in the industry. Today, Monsanto researchers throughout the world are actively working to discover, develop and deliver the next generation of agricultural products so farmers can get more out of each acre of farmland. Everything Monsanto does is aimed at helping to make agriculture more productive and more profitable for farmers, as well as more efficient and more sustainable for our earth.

Monsanto is proud to be a member of the Cotton Foundation and sponsor of ***STRESS PHYSIOLOGY IN COTTON***, the seventh book in the Cotton Foundation's cotton reference book series. The sponsorship is a reflection of the company's belief that continued support of the development of technologies and materials that promote the production of more cost-effective, higher yielding cotton, will make a stronger cotton industry.

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STRESS PHYSIOLOGY IN COTTON

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COTTON PHYSIOLOGY BOOK SERIES

FOREWORD

The Cotton Foundation Reference Book Series started with the first publication *COTTON PHYSIOLOGY* in 1985, edited by J.R. Mauney and J.M. Stewart, followed by a second book, *PHYSIOLOGY OF COTTON*, edited by J.M. Stewart, D.M. Oosterhuis, J.J. Heitholt, and J.R. Mauney published in 2010. This cotton physiology-related series is being continued using a smaller book format with each future book covering a specific pertinent topic. The smaller book format will facilitate timely publication and reduce the cost. The books will be published in book form as well as on CD's. Each book will incorporate a special symposium on a topic chosen by members of the National Cotton Council, Agronomy and Physiology Conference and held at the Beltwide Cotton Conferences. Prominent speakers will be invited to partake in the symposium, and together with additional invited authorities, will make up the subsequent book. The first of the new small book physiology of cotton series is on "Stress Physiology". The next symposium, to be held at the Beltwide Cotton Conferences in Atlanta in January 2011, and subsequent book, will be entitled "Flowering and Fruiting in Cotton".

PREFACE

If cotton production is to be sustainable and profitable, it is essential to know about the growth of the plant and how it responds to environmental stress. With its indeterminate growth habit the cotton plant self-stresses; that is, it grows and expands until some internal or external stresses begin to inhibit that growth and expansion. A sound understanding of physiological processes and how they respond to stress is needed to formulate strategies to manage those stresses to maximize production profitability. Choices about planting and harvest date, cultivar selection for soil and field location, fertility, pest management, and cultivation are all basically stress-management decisions. The effect of temperature, moisture, nutrition and pest attacks on cotton growth and yield depends upon the severity and timing of the stress and the ability of the plant to respond and adapt to it. While some of the effects of stress such as wilting have immediate cause and effect relationships, some effects such as pollen fertility are subtle and delayed in expression. Therefore, detailed knowledge of the effects of various stresses on the physiology of cotton is essential to an understanding of resistance and survival mechanisms for breeding for stress resistance and for formulation of improved management practices.

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