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# Agricultural Science 2013 Mid Year Exam

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Computer and Computing Technologies in Agriculture VII  
THEORY AND PRACTICE OF DEVELOPING SPECIALTY AND HIGH-QUALITY TOBACCO  
LEAVES IN WEST HENAN PROVINCE OF CHINA  
Soil-Specific Farming  
Radioisotopes in Weed Research  
The Soil-Human Health-Nexus  
Soil Management of Smallholder Agriculture  
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Issues in Agriculture and the Environment: 2013 Edition  
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*Agricultural Science*  
2013 Mid Year Exam

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## **GALLEGOS FELIPE**

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*Computer and Computing Technologies  
in Agriculture VII* Springer Nature

This book provides case studies on cultivating alternative crops and presents new cropping systems in many regions of the world. It focusses on new emerging research topics aiming to study all aspects of adaptation under several stresses including agricultural, environmental, biological and socioeconomic issues. The book also provides operational and practical solutions for scientists, producers, technology developers and managers to succeed the cultivation of new alternative crops and, consequently, to achieve food security. Many regions in the world are suffering from water scarcity, soil and water salinization and climate change. These conditions make it difficult to achieve food security by cultivating conventional crops. A renaissance of interest for producing alternative crops under water scarcity and water salinization has been, therefore, implemented primarily among small-scale producers, researchers and academics. The use of alternative crops (quinoa, amaranth, legume crops, halophytes, ...etc.) may provide some environmental benefits such as valorization of salt-affected soils, reduced pesticide application, enhanced soil and water quality and promotion of wildlife diversity. This also may provide some economic benefits such as providing the opportunity for producers

to take advantage of new markets and premium prices, spreading the economic risk and strengthening local economies and communities. Furthermore, alternative crops are often rich in proteins and minerals, and even some of them are Gluten free (quinoa). This reflects their importance to achieve food security in quantity and quality scale. The year 2013 was exceptional for alternative crops as it was the international year of quinoa celebrated by Food and Agriculture Organization (FAO). This reflects the importance of research conducted on quinoa and other alternative crops in many regions of the world.

**THEORY AND PRACTICE OF  
DEVELOPING SPECIALTY AND HIGH-  
QUALITY TOBACCO LEAVES IN WEST  
HENAN PROVINCE OF CHINA** CRC  
Press

The tobacco area of the west Henan Province is located at the border of Henan, Shanxi, and Shaanxi provinces, which is a transition zone of subtropical and warm temperate zone with mild climate and sufficient light. This area is suitable for the growth of high-quality tobacco leaves. However, in recent years, drought in the fast-growing period occurs often in tobacco leaf production, leading to late growth, late maturity, and declining quality of tobacco leaves. This study has found that the rainfall was low before July and had a high inter-annual variability by the analysis of the rainfall from April to September 1986-2022 in Sanmenxia [Sanmenxia, a city in Henan, China] tobacco-growing area and from May to

October 1986-2022 in Luoyang [Luoyang, a city in Henan, China] tobacco-growing area. It subsequently carries out a randomized block design in three key stages of tobacco growth, including the root extending stage, the fast-growing stage, and the mature stage, in Liangjiazhuang, Zhuyang Town, Sanmenxia. The randomized block design studies the effects of four drought-resistance technologies on Yunyan87's agronomic character, root activity, the content of reactive oxygen species (ROS), key enzyme activity in carbon-nitrogen metabolism, relative expression of key genes in carbon-nitrogen metabolism, field growth phase, conventional chemical component of top-three leaves and. The four drought-resistance technologies include water-holding agents and antitranspirant (no water-holding agents, using water-holding agents alone, using antitranspirant alone, and using water-holding agents and antitranspirant at the same time), different amount of water for irrigation (no irrigation when it is raining, and respectively irrigating to 40%, 60%, 80% of soil water content in the fast growing stage), different nitrogen application rates and basal-topdressing nitrogen ratios (total local conventional nitrogen fertilization of 3.5kg per acre, total nitrogen fertilization of 3kg and 6:4 of basal-topdressing nitrogen ratio per acre, total nitrogen fertilization of 3kg and 7:3 of basal-topdressing nitrogen ratio per acre, total nitrogen fertilization of 4kg and 6:4 of basal-topdressing nitrogen ratio per acre, and total nitrogen fertilization of 4kg and 7:3 of basal-topdressing nitrogen ratio per acre), and different substances of chemical manipulation (no chemical manipulation, spraying jasmonic acid, spraying abscisic acid,

and spraying ethephon). This study is conducive to exploring the appropriate dry-land cultivation techniques for different places. It also subsequently carries out a randomized block design in Wangcun, Xiaojie Town, Luoyang. The randomized block design studies the effects of four drought-resistance technologies on LY1306's agronomic traits, root activity, the content of reactive oxygen species (ROS), key enzyme activity in carbon-nitrogen metabolism, relative expression of key genes in carbon-nitrogen metabolism, the field growing period, conventional chemical components of top-three leaves. The four drought-resistance technologies include ridge tillage to preserve soil moisture (ridging in spring, ridging in winter, autumn ploughing and winter ridging), appropriate transplanting methods (conventional strong seedling transplanting, small seedling transplanting under film, and well-cellar seedling transplanting), different nitrogen fertilization and basal-topdressing nitrogen ratios (total local conventional nitrogen fertilization of 3.5kg per acre, total nitrogen fertilization of 3kg and 6:4 of basal-topdressing nitrogen ratio per acre, total nitrogen fertilization of 3kg and 7:3 of basal-topdressing nitrogen ratio per acre, total nitrogen fertilization of 4kg and 6:4 of basal-topdressing nitrogen ratio per acre, and total nitrogen fertilization of 4kg and 7:3 of basal-topdressing nitrogen ratio per acre), and different chemical regulators (no chemical regulators, spraying jasmonic acid, spraying abscisic acid, and spraying ethephon). This study is conducive to exploring the appropriate dry-land cultivation techniques for different places. Major research results are as follows: (1) The variation of rainfall in the

Sanmenxia tobacco-growing area from April to September from 1986 to 2022 shows a slow upward trend, and the rainfall of half of the years concerned of rainfall is lower than the average one. The variation coefficient of rainfall in September is the largest, followed by that in May, and the smallest is in July. According to the analysis of rainfall in each growing period of a flue-cured tobacco field, the variation of rainfall in the root stretching period, the fast growing period and the maturity period shows a slow downward trend respectively in general, and the relation is the root stretching period(262.23 mm) > the fast growing period(85.80mm) > the maturity period(81.84mm), which are inconsistent with the appropriate rainfall of tobacco-growing area field. The years of rainfall less than their own average rainfall accounts for 57%, 51% and 54% of all years, respectively. (2) In the study on the application of water-holding agent and antitranspirant, the application of water-holding agent and antitranspirant at the same time has the best effect on the growth and development of flue-cured tobacco, achieving the fastest fading of flue-cured tobacco and the most coordinated chemical components of flue-cured tobacco leaves. There is little difference between the application of a water-holding agent and the application of an antitranspirant, whose effect is just followed by the application of a water-holding agent and the antitranspirant at the same time. The agronomic traits of the group under treatment are better than those of the control group, and the agronomic traits of the application of a water-holding agent and antitranspirant at the same time are the best. 60 and 90 days after transplanting, the soil moisture content and root activity of groups under

treatments are significantly higher than those of the control group and the highest soil moisture content and root activity are obtained when water-holding agent and antitranspirant are applied at the same time, followed by the application of water-holding agent alone. 120 days after transplanting, the root activity decreases significantly in groups under treatments, and the root activity of the application of a water-holding agent and antitranspirant at the same time is the lowest and its root aging is the deepest. The contents of O<sub>2</sub>- and H<sub>2</sub>O<sub>2</sub> in groups under treatments are significantly higher than those in the control group, and the hydroxyl radical clearance in groups under treatments is significantly lower than those in the control group. Meanwhile, the accumulated active oxygen species in the application of a water-holding agent and antitranspirant at the same time is the highest. The nitrate reductase (NR) enzyme activity and glutamine synthetase (GS) enzyme activity in groups under treatments are significantly lower than those in the control group, and the expressions of NtNR and NtGS in groups under treatments are significantly lower than those in the control group. Meanwhile, the expressions of NtNR and NtGS genes in the application of water-holding agent and antitranspirant at the same time are 0.23 and 0.22 times of those in the control group. The sucrose phosphate synthetase (SS) enzyme activity of groups under treatments is significantly lower than that in the control group, and the gene expression of NtSPS and NtSS in groups under treatments are significantly lower than that in the control group. The gene expression of NtSPS and NtSS treated with water-holding agent and antitranspirant at the

same time are 0.21 and 0.20 times that of the control group. The enzyme activity and gene expression related to carbon and nitrogen metabolism are the lowest when water-holding agent and antitranspirant are applied at the same time. The growing period of the field treated with water-holding agent and antitranspirant at the same time is 126 days, which is 6 days, 6 days, and 19 days shorter than that of the application of water-holding agent, that of the application of antitranspirant alone and the control group. Compared with the control group, the contents of total sugar, reducing sugar and potassium increased, while the contents of total nitrogen, nicotine, and chlorine decreased. At the same time, the contents of total sugar, reducing sugar, the ratio of potassium to chlorine and the nitrogen-nicotine ratio in groups under treatments are the highest, and the chemical components of tobacco leaves are the most coordinated under the above treatment. (3) On the study of different irrigation, flue-cured tobacco first enters the maturity period and has the shortest growing period under the condition of irrigation to 80% soil moisture content. Compared with the control group, 60 and 90 days after transplanting, the agronomic traits of groups under treatment are better, among which that of the irrigation to 80% of soil moisture content is the best, followed by 60%. The root soil moisture content and root activity in groups under treatments are significantly higher than those in the control group, and that of group with irrigation to 80% soil moisture content is the largest. 120 days after transplanting, the root activity of flue-cured tobacco is the lowest when irrigating to 80% of soil moisture content. The contents of O<sub>2</sub>•- and

H<sub>2</sub>O<sub>2</sub> in groups under treatments are significantly higher than those in the control group, and that of the group with irrigation to 80% of soil moisture content is the highest, followed by 60%. The hydroxyl radical scavenging rate in groups under treatments is significantly lower than that in the control group, and that of the group with irrigation to 80% of soil moisture content is the lowest, followed by 60%. The NR enzyme activity, GS enzyme activity, SPS enzyme activity and SS enzyme activity are significantly lower than those in the control group, and those of the group with irrigation to 80% of soil moisture content is the lowest, followed by 60%. The gene expression of NtNR, NtGS, NtSPS and NtSS in groups under treatments are significantly lower than those in the control group, and those of treatment with irrigation to 80% soil moisture content is the lowest, followed by 60%. The field growing period of treatment with irrigation to 80% soil moisture content is 126 days, which is shortened by 6 days, 6 days and 19 days compared with treatment with irrigation to 60% soil moisture content, irrigation to 40% soil moisture content and the control group. Compared with the control, the reducing sugar and total sugar of cured tobacco increase with the increase of irrigation amount, while the content of nicotine, chlorine and total nitrogen decrease with that. In the treatment with irrigation to 80% soil moisture content, the ratio of potassium to chlorine and nitrogen-nicotine ratio of flue-cured tobacco is the highest, and the chemical components of them are most coordinated, followed by 60%. (4) In the study of appropriate nitrogen fertilization and basal-topdressing ratio of flue-cured tobacco, 30 days and 60 days after transplanting, the agronomic

traits of groups under treatments are significantly better than those of the control group, among which those of (T2) 3 kg total nitrogen and 7:3 basal-topdressing ratio is the best, followed by (T4) 4 kg total nitrogen and 7:3 basal-topdressing ratio, indicating that with the progress of field growing period, the total biomass of T2 is the largest, and the growth and development of flue-cured tobacco are the fastest. 90 days after transplanting, T2 still performs best in agronomic traits. 120 days after transplanting, the enzyme activities of carbon and nitrogen metabolism in groups under treatments are significantly lower than those in the control group, and the relative expression of NtNR, NtGS, NtSPS and NtSS genes in groups under treatments are significantly lower than those of the control group. The enzyme activities of carbon and nitrogen metabolism and the relative expression of NtNR, NtGS, NtSPS and NtSS genes in T2 are lowest, followed by T4. The contents of O<sub>2</sub>•<sup>-</sup> and H<sub>2</sub>O<sub>2</sub> in groups under treatments are significantly higher than those in the control group, and the hydroxyl radical scavenging rate of T2 is the lowest, and the content of reactive oxygen species of T2 is the highest. This experiment shows that with the increase of basal-topdressing nitrogen ratio, the capacity of carbon sequestration, transformation and metabolism in flue-cured tobacco decrease, the nitrogen metabolism and nitrogen use efficiency decrease, the content of reactive oxygen species increases, and the maturity and senescence of flue-cured tobacco are deepened. With the increase of basal-topdressing nitrogen ratio, the contents of total sugar and reducing sugar in flue-cured tobacco increase, while the contents of nicotine and total nitrogen

decrease. Among them, the ratio of potassium to chlorine and sugar alkali ratio of T2 are the best, where the chemical components of flue-cured tobacco are most coordinated. It is followed by T4. (5) In the study on spraying chemical regulators, spraying ethephon has the best effect of yellowing, and under this treatment, the growing period of the field is the shortest. It is followed by spraying jasmonic acid. 120 days after transplanting, the contents of chlorophyll a, chlorophyll b, carotenoid and total chlorophyll in groups under treatments are significantly lower than those in the control group. As spraying abscisic acid, the content of total chlorophyll is significantly higher than that of spraying jasmonic acid, which is significantly higher than that of spraying ethephon. Compared to the control group, the content of O<sub>2</sub>- content in groups under treatment are significantly higher, which are 1.31, 1.29 and 1.58 times of that in the control group, respectively. Compared to the control group, the content of H<sub>2</sub>O<sub>2</sub> content in groups under treatments is significantly higher, which are 1.12, 1.19 and 1.47 times of that in the control group, respectively. The hydroxyl radical scavenging rate of groups under treatments is significantly lower than that of the control group, and that of the group with spraying ethephon is the lowest. The NR enzyme activity, GS enzyme activity, SPS enzyme activity and SS enzyme activity in groups under treatment are significantly lower than those in the control group, and the key enzyme activity of carbon and nitrogen metabolism in the group with spraying ethephon is the lowest. Compared to the control group, the expressions of NtNR, NtGS, NtSPS and NtSS genes in groups under treatments are significantly lower,



which are, in treatment of spraying ethephon, 0.23, 0.21, 0.15 and 0.14 times of those in the control group. In the treatment of spraying ethephon, the growing period is the shortest (126 days), which is 6 days, 6 days and 19 days shorter than that of spraying abscisic acid, jasmonic acid and the control group. The content of total sugar in group of spraying ethephon is the highest (33.73%), an increase of 1.23% and 1.96% compared with that in the group of spraying jasmonic acid and abscisic acid respectively. The ratio of potassium to chlorine and sugar alkali ratio in the group of spraying ethephon are the best, which can better coordinate the chemical components of flue-cured tobacco. (6) The average rainfall in the Luoyang tobacco-growing area from May to October from 1986 to 2022 is 446.84 mm, showing a slow upward trend. Among all the years, the rainfall of 1997 is the lowest, and the rainfall of half of the years concerned of rainfall are lower than the average one. According to the analysis of rainfall in each growing period of a flue-cured tobacco field, the variation of rainfall in the root stretching period, the fast growing period and the maturity period shows a slow downward trend respectively in general, and the relation is the root stretching period(218.52mm) > the fast growing period(105.72mm) > the maturity period(89.49mm), which are inconsistent with the appropriate rainfall of tobacco-growing area field. The years of rainfall less than their own average rainfall accounts for 57%, 62% and 65% of all years, respectively. (7) In the study of ridge tillage to preserve soil moisture, ridging in winter, and autumn ploughing and winter ridging can significantly increase the soil moisture in the early growing period, improve the root activity

of flue-cured tobacco during flue-cured tobacco's growth and development, and reduce it in the maturity and aging period. With the maturity and aging of flue-cured tobacco, the capacity of nitrogen metabolism gradually decreases, and the capacity for carbon sequestration and transformation decreases. This study finds that in the late growing period of flue-cured tobacco, the key enzyme activity in carbon and nitrogen metabolism and the expression of related genes are significantly reduced by ridging in winter, and autumn ploughing and winter ridging. In addition, under these two treatments, the contents of nicotine, total nitrogen and chlorine are reduced, the contents of reducing sugar, total sugar and potassium are increased, the ratio of potassium to chlorine and sugar alkali ratio are more coordinated, and the quality of flue-cured tobacco is higher. The picking time of the upper leaves in the treatment of ridging in winter, and autumn ploughing and winter ridging is advanced by 11 days and 16 days respectively. (8) In the study of appropriate transplanting methods, small seedling transplanting under film and well-cellar seedling transplanting significantly reduce the root activity in the maturity period, which are 81.06% and 75.06% of CK, the name of the control group, respectively. As for well-cellar seedling transplanting, the key enzyme activity and the relative expression of carbon and nitrogen metabolism in flue-cured tobacco in the maturity period are significantly decreased, and the relationship is CK>T1>T2. The peroxidase activity in small seedling transplanting under film and well-cellar seedling transplanting are significantly lower than that in CK, 67.90% and 62.50% of that of CK

respectively. The conventional chemical components of flue-cured tobacco leaves are more coordinated in well-cellar seedling transplanting, and the quality of tobacco leaves is better. At the same time, small seedling transplanting under film and well-cellar seedling transplanting can advance the picking time and shorten the growing period of flue-cured tobacco. (9) In the study of appropriate nitrogen fertilization and basal-topdressing ratio of flue-cured tobacco, (T4) 4 kg total nitrogen and 7:3 basal-topdressing ratio shows higher photosynthetic rate and excellent agronomic traits in the early periods, and can be picked earlier in the maturity period. In general, before and during the fast growing period, when the nitrogen fertilization is the same, the content of plastid pigment, the capacity for material accumulation, root activity and antioxidant activity of tobacco plants increase with the increase of basal-topdressing nitrogen ratio. However, when the basal-topdressing nitrogen ratio is the same, the content of plastids pigment increases with the increase of nitrogen fertilization. The trend is opposite to that in the fast growing period. The carbonitase activity and the relative expression of carbazitase genes in tobacco plants decrease with the increase of basal-topdressing nitrogen ratio. Compared with the control group, all treatments promote the ratio of potassium to chlorine and sugar alkali ratio in chemical components of flue-cured tobacco. T4 is the best, which is followed by T2. In T4, the growing period is the shortest, which is 140 days, 8 days, 3 days, 5 days, and 18 days shorter than that of T1, T2, T3 and the control group. (10) In the study on spraying chemical regulators, the contents of chlorophyll a, chlorophyll b,

carotenoid and total chlorophyll in groups under treatments are significantly lower than those in the control group. 120 days after transplanting, the NR enzyme activity and GS enzyme activity in groups under treatments are significantly lower than those in the control group, and the effect of (T3) spraying ethephon is the most obvious. 120 days after transplanting, the SPS enzyme activity and SS enzyme activity in groups under treatments are significantly lower than those in the control group, and the effect of T3 is the best. 120 days after transplanting, the POD enzyme activity, SOD enzyme activity and CAT enzyme activity in groups under treatments are significantly lower than those in the control group. 120 days after transplanting, the relative expression of NtNCET1, NtPR1b, and NtEFE26 are promoted significantly. In general, the effect of T3 is the best. From the whole growing period of flue-cured tobacco fields, the growing period of T3 is the shortest, lasting 138 days, which is 3 days, 6 days and 21 days shorter than the growing period of spraying jasmonic acid, spraying abscisic acid and the control group. Compared with the control group, different treatments can promote the ratio of potassium to chlorine and sugar alkali ratio in chemical components of flue-cured tobacco, among which T3 is the best in all dictators. We are confident that people in the field of tobacco cultivation will derive valuable knowledge from reading this monograph.

Soil-Specific Farming CRC Press

Precision agriculture is now 'main stream' in agriculture and is playing a key role as the industry comes to terms with the environment, market forces, quality requirements, traceability,



vehicle guidance and crop management. Research continues to be necessary and needs to be reported and disseminated to a wide audience. This book contains peer reviewed papers presented at the 9th European Conference on Precision Agriculture, held in Lleida, Spain. The papers reflect the wide range of disciplines that impinge on precision agriculture: technology, crop science, soil science, agronomy, information technology, decision support, remote sensing and others. The broad range of research topics reported will be a valuable resource for researchers, advisors, teachers and professionals in agriculture long after the conference has finished.

### **Radioisotopes in Weed Research**

ScholarlyEditions

The term "soil health" refers to the functionality of a soil as a living ecosystem capable of sustaining plants, animals, and humans while also improving the environment. In addition to soil health, the environment also comprises the quality of air, water, vegetation, and biota. The health of soil, plants, animals, people, and the environment is an indivisible continuum. One of the notable ramifications of the Anthropocene is the growing risks of decline in soil health by anthropogenic activities. Important among these activities are deforestation, biomass burning, excessive soil tillage, indiscriminate use of agrochemicals, excessive irrigation by flooding or inundation, and extractive farming practices. Soil pollution, by industrial effluents and urban waste adversely impacts human health. Degradation of soil health impacts nutritional quality of food, such as the uptake of heavy metals or deficit of essential micro-nutrients, and contamination by pests and

pathogens. Indirectly, soil health may impact human health through contamination of water and pollution of air. This book aims to: Present relationships of soil health to human health and soil health to human nutrition. Discuss the nexus between soil degradation and malnourishment as well as the important links between soil, plant, animal and human health. Detail reasons soil is a cause of infectious diseases and source of remedial measures. Part of the Advances in Soil Sciences series, this informative volume covering various aspects of soil health appeals to soil scientists, environmental scientists and public health workers.

### **The Soil-Human Health-Nexus**

Scientific Publishers

Includes section "Recent literature."

*Soil Management of Smallholder*

*Agriculture* ScholarlyEditions

Issues in Applied Agriculture / 2013

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The content of Issues in Applied

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*The Drought-Resilient Farm* Springer Nature

The sequencing of genomes has been completed for an increasing number of crop species, and researchers have now succeeded in isolating and characterising many important QTLs/genes. High expectations from genomics, however, are waving back toward the recognition that crop physiology is also important for realistic improvement of crop productivity. Complex processes and networks along various hierarchical levels of crop growth and development can be thoroughly understood with the help of their mathematical description - modelling. The further practical application of these understandings also requires quantitative predictions. In order to better support design, engineering and breeding for new crops and cultivars for improving agricultural production under global warming and climate change, there is an increasing call for an interdisciplinary research approach, which combines modern genetics and genomics, traditional physiology and biochemistry, and advanced bioinformatics and modelling. Such an interdisciplinary approach has been practised in various research groups for many years. However, it does not seem to be fully covered in the format of book publications. We want to initiate a book project on crop systems biology - narrowing the gaps between genotypes and phenotypes and the gaps between crop modelling and genetics/genomics, for publication in 2013/2014. The book will be meant for those scientists and graduate students from fundamental plant biology and applied crop science

who are interested in bridging the gap between these two fields. We have invited a group of scientists (who have very good track records in publishing excellent papers in this field or in a closely related area) to contribute chapters to this new book, and they have agreed to do so.

*Agricultural Science Review* Storey Publishing

This book covers all aspects of deficiency of essential elements and excess of toxic ones in crop plants. The metal deficiency and toxicity are the two sides of same problem that are threatening to sustainable agricultural growth. The book presents prospective strategies for the management of elemental nutrition of crop plants. Chapters are arranged in a manner so as to develop a lucid picture of the topic beginning from basics to advanced research. The content is supplemented with flow charts and figures to make it convenient for readers to holistically grasp the concepts. It will be a value addition for students, research scholars and professionals in understanding the basics as well latest developments in the area of metal deficiency and excess in crop plants.

*Proceedings of Selected Articles of 2013 World Agricultural Outlook Conference* Frontiers Media SA

Food security has always been a major global concern and is getting more attention in recent years. In fact, the global economy and stability has been severely challenged by the precarious state of food security, which was exacerbated by a combination of sharp price volatility and disastrous weather conditions related to climate change. The book aims to improve the analysis and projection of agricultural production and marketing, facilitates information

exchange to better food supply and demand, and ultimately contributes to enhance world food security and sustainable global agricultural development.

**Catalog of Federal Domestic Assistance** MIT Press

This book will bring together all recent and updated information on RCT in pulses and pulse based cropping system which will be of immense use to researchers, extension personnel, students, research scholars across the nation.

*Proceedings of 2013 World Agricultural Outlook Conference* CRC Press

Faced with challenges of resource scarcity and environmental degradation, it is important to adopt innovative farming systems that maximize resource efficiency while protecting the environment. **Soil-Specific Farming: Precision Agriculture** focuses on principles and applications of soil-specific farming, providing information on rapidly evolving agricultural technologies. It addresses assessments of soil variability and application of modern innovations to enhance use efficiency of fertilizers, irrigation, tillage, and pesticides through targeted management of soils and crops. This book provides the technological basis of adopting and promoting precision agriculture (PA) for addressing the issues of resource scarcity, environmental pollution, and climate change. It focuses specifically on PA technologies and discusses historical evolution, soil variability at different scales, soil fertility and nutrient management, water quality, land leveling techniques, and special ecosystems involving small landholders and coastal regions. Highlighting the scale-related issues and concerns of small landholders, the text details the

efficient use of resources on the basis of soil/field variability and site-specific conditions. It examines how PA technology can increase productivity, enhance profitability, and minimize environmental degradation. Woven throughout is the theme of sustainable use of resources.

**The Complete Guide to Restoring Your Soil** CRC Press

Strong leadership is the cornerstone of advancement. Nowhere is this more important than the field of education, where students undergo training to effectively overcome obstacles and challenges, whether in the classroom or in the workforce. **Cases on Leadership in Adult Education** highlights real-world examples of students inspired and invigorated to higher levels of achievement in both their professional and academic lives, as well as instances of leadership gone wrong and examples of what not to do when put in charge of an organization. Featuring case studies covering a wide range of disciplines, this book is a valuable resource for instructors of adult education in universities and community colleges, practitioners in the education field, adult students of various backgrounds, and managers or leaders seeking improvement within their respective organizations. This authoritative reference source features chapters on a broad scope of education and training issues including, but not limited to, agricultural training, leadership styles, lifelong learning, management issues, poverty reduction, rehabilitation programs, trends in teaching culture, and vocational training.

*Agricultural Science Senior Syllabus 2013* CRC Press

Food and the global agricultural system has become one of the defining public

concerns of the twenty-first century. Ecological disorder and inequity is at the heart of our food system. This thoughtful and confronting book tells the story of how the development of modern agriculture promised ecological and social stability but instead descended into dysfunction. Contributing to knowledge in environmental, cultural and agricultural histories, it explores how people have tried to live in the aftermath of 'ecological imperialism'. *The Broken Promise of Agricultural Progress: An environmental history* journeys to the dry inland plains of Australia where European ideas and agricultural technologies clashed with a volatile and taunting country that resisted attempts to subdue and transform it for the supply of global markets. Its wide-ranging narrative puts gritty local detail in its global context to tell the story of how cultural anxieties about civilisation, population, and race, shaped agriculture in the twentieth century. It ranges from isolated experiment farms to nutrition science at the League of Nations, from local landholders to high profile moral crusaders, including an Australian apricot grower who met Franklin D. Roosevelt and almost fed the world. This book will be useful to undergraduates and postgraduates on courses examining international comparisons of nineteenth and twentieth century agriculture, and courses studying colonial development and settler societies. It will also appeal to food concerned general readers.

#### Crop Responses to Environment

Routledge

Herbicides are of great importance in weed management and are one of the most widely used pesticide groups for weed control across the globe. Concerns around the residual effects of these

intensively used chemicals are equally widespread. Offering a new direction for research that focuses on herbicide behavior and its impacts on the environment, this book covers the use of radioisotopes in weed research and the detoxification of herbicides. Applying technological advances in radiation detection, *Radioisotopes in Weed Research* explains how isotopic techniques can be used to identify degradation products and trace the fate of herbicides applied to crop plants. This book provides essential information on the historical use and recent advances of radioisotopes in weed research. It demonstrates the potential these methods offer the field of weed science in gaining a better understanding of the behavior of herbicides in plants and soil and working to ensure the continuous, effective, and safe use of herbicides, minimizing harmful impacts on ecosystems. Features: Explains the radiometric method with studies of radiolabelled herbicides and includes case studies as examples Describes radiometric methods to study the behavior of herbicides in soil from transport and transformation to retention Elucidates the absorption, translocation, and metabolism studies of herbicides in plants Authored by a team of leading scientists, this book is written for professors, researchers, extensionists, graduate and undergraduate students, rural producers, and other professionals involved in weed science.

#### Taking Stock of National Agricultural R&d Capacity in Africa South of the Sahara

Springer

Sustainability in agriculture and associated primary industries, which are both energy-intensive, is crucial for the development of any country. Increasing

scarcity and resulting high fossil fuel prices combined with the need to significantly reduce greenhouse gas emissions, make the improvement of energy efficient farming and increased use of renewable energy essential. This book provides a technological and scientific endeavor to assist society and farming communities in different regions and scales to improve their productivity and sustainability. To fulfill future needs of a modern sustainable agriculture, this book addresses highly actual topics providing innovative, effective and more sustainable solutions for agriculture by using sustainable, environmentally friendly, renewable energy sources and modern energy efficient, cost-improved technologies. The book highlights new areas of research, and further R&D needs. It helps to improve food security for the rapidly growing world population and to reduce carbon dioxide emissions from fossil fuel use in agriculture, which presently contributes 22% of the global carbon dioxide emissions. This book provides a source of information, stimuli and incentives for what and how new and energy efficient technologies can be applied as effective tools and solutions in agricultural production to satisfy the continually increasing demand for food and fibre in an economically sustainable way, while contributing to global climate change mitigation. It will be useful and inspiring to decision makers working in different authorities, professionals, agricultural engineers, researchers, and students concerned with agriculture and related primary industries, sustainable energy development and climate change mitigation projects.

**Advances in Agriculture Research and Application: 2013 Edition**

Academic Press

Nearly two billion people depend on

hundreds of millions of smallholder farmers for food security. Yet, these farmers' lives also hang in the balance due to their extreme vulnerability to the risks of soil degradation and depletion, soil exhaustion, climate change, and numerous biotic and abiotic stresses. Soil Management of Smallholder Agriculture

**Agricultural Science** CRC Press

Interactions of Biochar and Herbicides in the Environment details how biochar interferes with herbicide behavior which includes processes such as sorption-desorption, runoff, leaching, and degradation in soil and weed control efficacy. The book provides essential information on biochar applications in agriculture, production systems, and the physicochemical properties of biochar and herbicides, and their interactions.

Features:

- Elucidates the physicochemical characteristics of biochar that affect herbicide bioavailability in soil solution
- Demonstrates the remediation of herbicide-contaminated waters with the addition of biochar to avoid environmental impacts to aquatic organisms
- Describes numerous agronomic and environmental benefits of biochar and its potential as a soil amendment to herbicide remediation
- Includes diagrams of herbicide behavior in the environment to further the user's knowledge

Written by a team of international experts, Interactions of Biochar and Herbicides in the Environment is a valuable resource for students and professionals involved with weed science and soil pollution, and is of great interest to those concerned with pesticides and their fate in the environment.

Crop Systems Biology Springer

This report is a timely input into the

ongoing development agenda for Africa South of the Sahara (SSA). The 2013 report on agriculture and food systems by the United Nations' Sustainable Development Solutions Network released a set of post-2015 development goals, including recommendations that low- and middle-income countries increase their spending on agricultural research and development (R&D) by a minimum of 5 percent per year during 2015-2025, and that they allocate at least 1 percent of their agricultural gross domestic product (GDP) to public agricultural R&D. More recently, the Science Agenda for Agriculture in Africa was adopted at the African Heads of State Summit, necessitating the development of a continent-wide implementation plan. This report, which summarizes SSA's recent progress in developing its national agricultural R&D systems, is intended to serve as an important input into, and potential benchmark for, the implementation of the science agenda in SSA and the broader development agenda for the region. The analysis is based on comprehensive primary datasets by Agricultural Science and Technology Indicators (ASTI), the most recent of which was compiled during 2012-2013.

#### **Agricultural Science** IGI Global

Following in the tradition of its predecessor, *Crop Responses to Environment*, this fully updated and more comprehensive second edition describes aspects of crop responses to environment that are particularly relevant to the development of improved crop cultivars and management methods on a global scale. It includes an extensive discussion of the difficulties in developing agricultural systems that accommodate increasing human needs for agricultural products during the

twenty-first century in a sustainable manner. The book features new sections on adaptation to global climate change including adapting to global warming, elevated atmospheric carbon dioxide concentration, and increased flooding and salinity through plant breeding and changes in crop management. Warming effects include stressful effects of heat on pollen development and reduced winter chilling effects on fruit and nut trees. The book examines principles, theories, mathematical models, and experimental observations concerning plant responses to environment that are relevant to the development of improved crop cultivars and management methods. It illustrates the importance of considering emergent plant properties as well as reductionist approaches to understanding plant function and adaptation. Plant physiological and developmental responses to light and temperature, and plant water relations are considered in detail. Dr. Hall also describes climatic zone definitions based on temperature, rainfall, and evaporative demand in relation to plant adaptation and the prediction of crop water use. Irrigation management and crop responses to salinity, flooding and toxic levels of boron and aluminum are considered. Crop responses to pests and diseases as they interact with crop responses to physical and chemical aspects of the environment are examined. The book concludes with analyses illustrating the relevance of crop responses to environment to plant breeding.

*Six Chemicals That Changed Agriculture*  
Springer

"Dale Strickler is an expert on building healthy soil and restoring degraded soil, and in *The Complete Guide to Restoring Your Soil*, he presents the science of soil,



along with proven methods of restoring depleted soil and agricultural practices

from around the world that continue to build soil, rather than cause it to deteriorate"--