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Breeding strategies for sustainable forage and turf grass improvement Forage and Livestock Systems for Sustainable High Plains Agriculture **Evaluation of Medicago Sativa Spp. Falcata for Sustainable Forage Production in Michigan** Forage For Sustainable Livestock Production Environmental Indicators for Sustainable Beef Cattle/forage Production **Forage for Sustainable Livestock Production Management Strategies for Sustainable Cattle Production in Southern Pastures** Forage Legumes for Sustainable Agriculture and Livestock Production in Subhumid West Africa *Integrated Management for Sustainable Forage-based Livestock Systems in the Tropics* **Management of Biological Nitrogen Fixation for the Development of More Productive and Sustainable Agricultural Systems** Sustainable Year-round Forage Production and Grazing/browsing Management for Goats in the Southern Region *Grass Forage Utilization by Lactating Dairy Cattle for Sustainable Agriculture* **Modern Sustainable Production Needs for Pasture and Forage Systems** **Sustainable Use of Grassland Resources for Forage Production, Biodiversity & Environmental Protection** *Systems of sustainable production and utilization of forage crops* *The Drought-Resilient Farm* **Capturing Sunlight, Book 1** Introduction to Pasture and Grazing Management in Western Oregon **Animal Agriculture and Natural Resources in Central America: Strategies for Sustainability** *Evaluation of Sustainable Forage Systems for Meat Goat Production in the Southern U.S.* **Sustainable use of Genetic Diversity in Forage and Turf Breeding** **Sustainable Forage Systems: Towards a water and nutrient efficient forage production in semi-arid regions of Pakistan** **Enhancing Agricultural and Environmental Sustainability Through the Use of Forage Crops** **Growth, Yield and Quality of Maize Forage Under Conventional and Sustainable Cropping Systems** Crop and Forage Production Using Saline Waters **Forage Options for Smallholder Livestock in Water-scarce Environments of Afghanistan** **Sustainable Forage Systems : Final Report, April 1, 1997 - April 15, 2001** *Tropical Legumes for Sustainable Farming Systems in Southern Africa and Australia* **Northeast Foraging** **Sustainable Year-round Forage System for Goat Production in the Southern USA** Conference Proceedings for Sustainable Agriculture for Today and Tomorrow Strategies for Sustainable Agriculture with Particular Regard to Productivity and Fossil Energy Use in Forage Production and Organic Arable Farming **Forages for Smallholder Farmers, Ethiopia** **Forage Crops Basis of the Sustainable Animal Husbandry Development** Advances in Legumes for Sustainable Intensification *Ecological impact of tropical pastures and the potential of forage plants for sustainable land use systems in the tropics* **The Kerr Center for Sustainable Agriculture, Inc** **The Contribution of Managed Grasslands to Sustainable Agriculture in the Great Lakes Basin** **Sustainability of Agricultural Environment in Egypt: Part II**

Discusses 11 programs of the Kerr Center for Sustainable Agriculture. *Advances in Legume-based Agroecosystem for Sustainable Intensification* explores current research and future strategies for ensuring capacity growth and socioeconomic improvement through the utilization of legume crop cultivation and production in the achievement of sustainability development goals (SDGs). Sections cover the role of legumes in addressing issues of food security, improving nitrogen in the environment, environmental sustainability, economic-environmentally optimized systems, the importance and impact of nitrogen, organic production, and biomass potential, legume production, biology, breeding improvement, cropping systems, and the use of legumes for eco-friendly weed management. This book is an important resource for scientists, researchers and advanced students interested in championing the effective utilization of legumes for agronomic and ecological benefit. Focuses on opportunities for agricultural impact and sustainability Presents insights into both agricultural sustainability and eco-intensification Includes the impact of legume production on societal impacts such as health and wealth management “An invaluable guide for the feast in the East.” —Hank Shaw, author of the James Beard Award-winning website *Hunter Angler Gardener Cook* The Northeast offers a veritable feast for foragers, and with Leda Meredith as your trusted guide you will learn how to safely find and identify an abundance of delicious wild plants. The plant profiles in *Northeast Foraging* include clear, color photographs, identification tips, guidance on how to ethically harvest, and suggestions for eating and preserving. A handy seasonal planner details which plants are available during every season. Thorough, comprehensive, and safe, this is a must-have for foragers in New York, Connecticut, Massachusetts, Maine, New Hampshire, Vermont, Pennsylvania, New Jersey, Delaware, and Rhode Island. The papers in this book come from an ACIAR project to develop sustainable animal and cropping systems in southern Africa. The papers focus on

aspects of forage and ley legumes and include the interactions with animal and crop production, and farmer evaluation and adoption of new technologies in farming systems of South Africa and Zimbabwe. There is magic in forages. It's the magic of sunlight, green leaves, and photosynthesis. This magic has created a vast array of plants that contain the protein, fiber, and starch upon which our livestock depend. The challenge is to make this magic work for you. We need to develop the skills and the knowledge to grow forages effectively and sustainably. This book offers a distillation of that knowledge for anyone interested in the modern concepts of grazing - especially for the grazier who raises livestock on forages. This is not a dry textbook or a collection of homey anecdotes. Rather, we get under the hood with down-to-earth essays on the practical skills and underlying science. Sometimes with a bit of humor. This is a fun read. In sixty-two entertaining chapters, you'll find no-nonsense information on grazing techniques, forage growth, soil fertility, nutritional quality, hay and silage. You'll learn how to look at a pasture and know when to open the gate and what happens to forages during grazing. There's even a chapter on the forage nutrition of dinosaurs. And the last section of this book is special: a practical in-depth handbook on improved pastures. It's a systematic outline of the skills of Management Intensive Grazing. These pages will open doors to a wizardly world of forage skills. You'll gain knowledge that will enrich your days and help you make good decisions about your farm or ranch. This is a book that will stay with you long after you finish reading it. And - grazier or not - you'll never again drive past a pasture without seeing it in a different light. Results of a three-year research project conducted in the subhumid region of Nigeria are presented. In order to promote the use of forage legumes for sustainable agriculture, a number of research aspects were addressed including screening collections of the promising pasture legumes *Centrosema brasilianum* and *Aeschynomene histrix* and small-scale collection of herbaceous forage species in northern Nigeria. Studies to optimise the utilisation of selected forage legumes included the use of material in combination with grasses for calf supplementation and combining selected legumes to give stable, year-round pastures. Considering the importance of integrating crop and livestock production, studies were also carried out to investigate the potential of selected forage legumes to contribute to both fodder and crop production. Forage seed production and collaboration with national and international institutes in West Africa have also featured. "This project aimed to improve the livelihoods of smallholder livestock farmers in the mixed crop/livestock areas of Afghanistan that had limited access to water. The project could increase the availability of feed resources adapted for areas with little access to water. This project developed economically viable and sustainable forage production systems to reduce winter feed gaps in the water constrained provinces of Baghlan and Nangarhar. Shortages of forage limit animal productivity and put households at economic risk, particularly over winter. Producing and marketing sustainable forage is not economic because farmers lack quality seed of improved forage varieties, seed and fodder markets function poorly, and national policy is biased towards producing strategic food crops. This project enhanced national uptake of research outputs through linking national and international research systems and input, marketing and service providers. Women play important roles within integrated crop and livestock production systems; in developing socially sustainable forage production systems, this project aimed to ensure equitable access to knowledge, public and private services."--Website. Management Strategies for Sustainable Cattle Production in Southern Pastures is a practical resource for scientists, students, and stakeholders who want to understand the relationships between soil-plant interactions and pasture management strategies, and the resultant performance of cow-calf and stocker cattle. This book illustrates the importance of matching cattle breed types and plant hardiness zones to optimize cattle production from forages and pastures. It explains the biologic and economic implications of grazing management decisions made to improve sustainability of pastures and cattle production while being compliant with present and future environmental concerns and cattle welfare programs. Documents the effects of cattle grazing on greenhouse gas emissions and carbon footprints Discusses strategies to enhance soil fertility, soil health, and nutrient cycling in pastures Provides information on the use of stocking rates, stocking strategies and grazing systems to optimize cow-calf production of weaned calves and stockers. Presents innovations in cattle supplementation and watering systems to minimize negative impacts on water and soil health Includes methods for weed control to maintain pasture condition and ecosystem stability Describes management strategies to integrate cattle operations with wildlife sustainability Grassland produces feed for livestock, improves soil fertility and structure, protects water resources and may contribute to climate change mitigation through carbon storage and to biodiversity preservation. It simultaneously maintains sustainable economic outputs for farmers and provides ecosystem services. Turf similarly considerably contributes to our environment by adding beauty to our surroundings, providing a safe playing surface for sports and recreation. The species diversity present in most grasslands and turfs is a functional diversity contributing to the previously mentioned agronomic and environmental benefits. The species belong to different functional groups and the adequate species composition may maximise the agronomic performance through a higher production and a better quality and the environmental benefits through symbiotic nitrogen fixation or sources of pollen and nectar to pollinators. In a given grassland or turf, the genetic diversity available in each variety contributes to this economic and environmental performance, but also to the

stability of these performances including the stability of the resistance against pathogens and pests. Natural grasslands share many species with the sown swards. They may be regarded as favourable sites for in situ preservation of genetic diversity as well as valuable sources of diversity for breeding. The Contribution of Managed Grasslands to Sustainable Agriculture in the Great Lakes Basin explores the many benefits of perennial forages on contemporary farming and shows how pasture, or "grass," is the central, sustaining element in whole farm resource management. The book challenges the narrow view of the 1950s that grass could be replaced with resource-intensive specialized technologies for crop and livestock production and presents a more holistic, less capital- and resource-intensive approach to livestock management. Readers increase their awareness of the environmental ramifications of continuous annual cropping in support of high-density confinement feeding systems as they focus their attention on grass-based livestock farming as a more sustainable and environmentally friendly alternative. The Contribution of Managed Grasslands to Sustainable Agriculture in the Great Lakes Basin presents helpful information to agriculturalists working in the fields of crop and animal sciences, resource management, agronomy, agricultural economics, and sustainable agriculture. The book is equally valuable to environmentalists interested in agroecology, biotic diversity, and holistic ecology. Specific topics readers explore include: the multiple roles of managed grasslands, both as a source of ruminant nutrition and as a complement to arable cropping the environmental and economic forces which have altered the prominence of managed grasslands in North America soil, nutrient, and water conservation with managed grasslands a basic introduction to plant/animal systems an historical perspective on pasture investigation in Ontario The Contribution of Managed Grasslands to Sustainable Agriculture in the Great Lakes Basin bridges the gap between livestock agriculturists and environmentalists. After all, perennial forages are an essential and irreplaceable tool for soil, water, and air resource management, and livestock agriculture (especially ruminant agriculture) provides the economic rationale for growing these forages. Equally important is the book's approach to specific obstacles, such as the lack of direct information from predecessors working in the same field and unsupportive funding sources and policies based on the archaic notion that pasture is an outdated technology. Overall, this book underscores the critical relevance of managed grasslands to the sustainability of agriculture as a whole and serves as a guide to the types of grassland research and to the rationale for changes of the focus of the research over the decades. Especially important for researchers in this field, The Contribution of Managed Grasslands to Sustainable Agriculture in the Great Lakes Basin helps identify useful background information and suggests promising new directions for future research. Rainfall levels are rarely optimal, but there are hundreds of things you can do to efficiently conserve and use the water you do have and to reduce the impact of drought on your soil, crops, livestock, and farm or ranch ecosystem. Author Dale Strickler introduces you to the same innovative systems he used to transform his own drought-stricken family farm in Kansas into a thriving, water-wise, and profitable enterprise, maximizing healthy cropland, pasture, and water supply. Ranging from simple, short-term projects such as installing rain-collection ollas to long-term land-management planning strategies, Strickler's methods show how to get more water into the soil, keep it in the soil, and help plants and livestock access it. This is an overview of a sustainable forage project that had two integrated objectives: to conduct a field testing & data gathering activity addressing important range/pasture issues & opportunities; and to deliver an ecoregion-sensitive rangeland, pasture land, and hay land extension program. Activities in the extension component included producer & professional contacts, exhibitions, field days & other extension events, publications, and establishment of an Internet site. The data gathering component included field testing activities under the Grazing & Pasture Technology Program. Lists of events conducted, exhibition displays, publications, and broadcast presentations are appended. This book is based on information generated over a decade of research implemented to develop integrated forage production options in medium altitude and highland areas of western Ethiopia. It is composed of nine chapters. In the first chapter a brief review of feed resources research outputs with particular emphasis on western zones of the country is presented. Chapters ranging from 2 to 8 report findings from various field research activities in the areas of pasture management, integrated food and feed production systems and evaluation of the residual effect of improved forages fallow on maize grain yield and yield components. In the ninth chapter, conclusions and recommendations are given. The information contained in the book is believed to contribute much for enhancing sustainable forage production mainly under tropical and subtropical regions. Salinity becomes a problem in Semiarid and arid and arid regions of the world, posing major challenge to provide food for the rapidly increasing population. Inappropriate agricultural practices have resulted in increasing saline waters and saline lands, which are worthless for conventional agriculture. Excess salts accumulate in the root zone, prevents water absorption from surrounding soil and lowering the amount of water available to the plant. The most likely effect of salinity on plants is stunted growth, and physical damage or mortality may be caused at higher salt concentration. Researches conducted in last few decades reveal hundreds of salt tolerant plants in the world most of which could be utilized as cash crops using novel ideas and technologies. However, there is still a need to develop technology of saline agriculture suited to the different ecosystems of the world and major efforts are required to domesticate them using modern technology. This

publication, through its 27 chapters exposes the difficulty of squeezing agricultural output, faced by mostly dry and saline parts of the world due to scarcity of clean water and fertile land for crop production. The volume also provides a fascinating view on the safeguards and remedies to overcome this problem by means of modern techniques and natural resistant phenomenon of the flora in itself. The volume is chiefly based on the discussions and presentation during the International workshop on Crop and Forage Production using Saline Waters in Dry Areas held in Birjand, Iran during 7-10 May, 2006. The information presented herein would hopefully serve as a valuable reference material for the professionals and those who are actively involved in agriculture, research and management of crop production in dry and saline areas. Contents Chapter 1: Sustainable Utilization of Halophytes and the Significance of that Concept for Future Generation by Helmut Lieth; Chapter 2: Potentials of Using Saline Soils and Waters for Forage Production in Dry Regions by H Tavakoli, I Filehkesh, V Kashki and J Bashtini; Chapter 3: Gainful Utilization of Salt Affected Lands: Prospects and precautions by Raziuddin Ansair, M Ajmal Khan and Bilquees Gul; Chapter 4: Molecular View on Determinants and Effectors of Halophytic Salt Tolerance: A Case study on *Suaeda aegyptiaca* by H Askari and M Kafi; Chapter 5: Nuclear Techniques Aided Studies for Sustainable Biomass Production in Salt Affected Soils Using Haloculture Method by J Rastegari and M Farhangi-Sabet; Chapter 6: Water Uptake by Roots and Crops Salt Tolerance Under Brackish Irrigation as Affected by Root Environment by U W E Schleiff; Chapter 7: Investigation of Crop Production Potentiality of Saline Lands by M Deghani, G Hadarbadi, A Nasrabady, Mohamad and E Kyham; Chapter 8: Ecosystems as Accelerators of the Energy Flow from the Earth Surface by Helmut Lieth; Chapter 9: Chemical Composition and Digestible Parameters of Various by A Riasi and M Danesh Mesgaran; Chapter 10: Halophytes Genetics of Tolerance to Water Stress and Salinity in Crop Plant by B Sharma; Chapter 11: *Kochia* (*Kochia scoparia*): To Be or Not To Be by M J Al-Ahmadi and M Kafi; Chapter 12: Effect of Nitrogen and Phosphorous Fertilizers on the Growth of Some Halophytic Forage by M Karimi, S A M Cheraghi, M H Banakar and S H Ismail; Chapter 13: Evaluation of Promising Bread Wheat (*Triticum aestivum* L) Lines/Varieties in Saline Condition by M H Saberi, A Azari Naserabad and H Tajalli; Chapter 14: *Panicum antidotale*: A Potential Grass for Salt Affected Soils by Mansoor Hameed and Muhammad Ashraf; Chapter 15: Salt Sensitivity of Wheat at Germination Stage by G H Ranjbar, S A M Cheraghi and M H Banakar; Chapter 16: Agriculture Sector of the Beninese Economy by A D T E Christophe; Chapter 17: Biosaline Agriculture in Pakistan by M Ajmal Khan; Chapter 18: Crop and Forage Production Using Saline Waters in Dry Areas by L Y Win; Chapter 19: Crop Production in Salinity Affected Areas in Sri Lanka by A A Y Amarasinghe; Chapter 20: Current Status of Saline Agriculture in Iran by M Kafi, M Jami Al Ahmadi and G R Zamani; Chapter 21: Ecology and Economic Potential of Halophytes: by A Case Study from Turkey by M Ozturk, A Guvensen and S Giicel; Chapter 22: Forage Production and Management in Dryland Areas of Uganda by E N Sabiiti, S K Mugasi and S Katuromunda; Chapter 23: Indigenous Knowledge and Agriculture Development in Semi-arid Southeastern Indonesia by Benyamin Lakitan; Chapter 24: Saline Water Use in Agriculture: Highlights of Indian Research by R K Trivedy; Chapter 25: Salinity and Use of Saline Waters for Irrigation in Crops and Forages in Cuba by Aurelio Alvarez Menedez; Chapter 26: Salinity Development in the Dry Zone of Sri Lanka: A Review by M M M Najim and K P K Jayakody; Chapter 27: Some Forage Substitutes for the State of Qatar by Yassin M Ibrahim

Table 1. Global allocation of arable land between different commodities Globally, cereal cropping dominates cultivated land Commodities' Proportion of land area use (around 50% of total area, Table 1). The remain (%) ing arable land is used for production of oilseed, fibre, or food and cash crops. In addition, vast areas are Cereals maintained under temporary or permanent pasture for Wheat 16 forage production (2-3 fold greater than the total area Rice 10 under cultivation and permanent crop; Table 1, Fig. Maize 9 1). All cultivated crops, except for legumes (pulses All other cereals 13 and legume oil seeds) require the soil to provide rel Total 48 atively large amounts of nitrogen (N). It is necessary for the three most important cereals, wheat (*Triticum Legumes aestivum*), rice (*Oryza sativa*) and maize (*Zea mays*), Legume pulses 5 to take up 20 to 40 kg soil N ha -lover a period of 3 Legume oilseeds 6 to 5 months to satisfy the N requirements of the seed and supporting vegetative structure for each tonne of Total II grain produced (e. g. Fig. 2; Myers, 1988). Produc tive pastures on the other hand may assimilate > 100 Other crops I kg N ha- each annum, of which 50 to 90% will be Other oilseeds 6 consumed by livestock in intensively grazed systems Beverages / Tobacco 7 (Ledgard, 1991; Thomas, 1995). This volume discusses the sustainability of Egypt's agriculture and the challenges involved. It provides a comprehensive review and the latest research findings, and covers a variety of topics under the following themes: · Integrated natural resources management for sustainable production · Integrated biopesticides and biofertilizers for sustainable agriculture · Integrated plant and animal production for a sustainable food supply · Policies for sustainable agriculture in Egypt The volume closes with a summary of the key conclusions and recommendations from all chapters. Together with the companion volume Sustainability of Agricultural Environment in Egypt: Part I, it offers an essential source of information for postgraduate students, researchers, and stakeholders alike. From the 4th – 8th of September 2011, the Eucarpia Fodder Crops and Amenity Grasses Section, held its 29th Meeting in the surroundings of Dublin Castle in Ireland. The theme of the meeting was 'Breeding

strategies for sustainable forage and turf grass improvement'. Grasslands cover a significant proportion of the land mass of the world, and play a pivotal role in global food production. At the same time we are faced with several challenges that affect the way in which we think about this valuable set of resources. The population of the world is expected to exceed 9 billion by 2050, and increase of about one third relative to today's levels. This population increase will be focused in urban areas, and in what are currently viewed as "developing" countries, meaning that the buying power of this increased population will be greater – shifting the balance of demand from staple crops to high value items such as meat and dairy products. Overall that the world will have to approximately double agricultural output across all categories of food to meet the demands of this larger, urbanised population. This is occurring against a backdrop of equally large challenges in terms of global climate change. Agriculture is already a significant contributor to e.g. greenhouse gas emissions, deforestation and soil erosion. The situation is made more complex by an increased emphasis on biofuels as a solution for our imminent oil shortage, resulting in increased competition between land utilised for food and fuel. In short, agriculture must continue to feed the world, whilst not contributing to damaging it further. It must be sustainable. Plant breeding plays a significant but frequently understated role in meeting the challenges presented by this complex and changing scenario. However, plant breeding and improvement is itself undergoing radical change driven by technology. This book explores how forage and turf breeding is changing and adapting to meet these challenges using the technological advances being experienced in plant breeding as a whole. Lectures delivered at the Winter School on Recent Advances in Forage Evaluation and Utilization for Sustainable and Economic Livestock Production, held at Jhansi on 31st October to 20th November 2008. Green forage is the most important feed for livestock in Pakistan but with rapid urbanisation demands are increasing with reduced arable land. The first study of this book is about socio-economic structure of forage producing farmers. This study identified availability of irrigation water and high cost of fertilizers as major problems of the farmers. Second study of this book investigates the effect of cropping system, fertilizer and irrigation on total annual biomass yield of forage. This study found drought adoptive cropping system more productive and water use efficient with limited resources of fertilizer and irrigation. Third study evaluates the effect of fertilizer, irrigation and cropping system on crude protein (CP) and metabolizable energy (ME) and irrigation water use efficiency of CP and ME. This study also identified drought adoptive cropping system more productive and water use efficient with respect to CP and ME. From the whole study it can be concluded that the implementation of DACS in Pakistan's agriculture may contribute to a more efficient and sustainable forage production and by this may enhance also the profitability of the farmers. This publication is for farmers and ranchers new to managing pastures in the Pacific Northwest. It is a complement to the online Introduction to Pasture and Grazing Management course available at <https://workspace.oregonstate.edu/course/pasture-and-grazing-management>. It provides the basics of establishing and maintaining a productive pasture for your livestock. The core principle is that as a livestock producer, you are actually a grass and legume farmer, using the forages that you grow as a feed source for your animals. Developing this perspective will help you better manage pastureland for sustainable forage-livestock systems

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