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CONTENTS

Introduction to *Dissertations Abstracts International*.....iii
UMI® Dissertation Services.....iv
How to Order Dissertation and Masters Thesis Copies vi
Subject Categories vii
Participating Institutions.....ix

BIOLOGICAL SCIENCES

AGRICULTURE 2151
 GENERAL 2151
 AGRONOMY 2151
 ANIMAL CULTURE AND NUTRITION 2154
 ANIMAL PATHOLOGY 2155
 FISHERIES AND AQUACULTURE 2156
 FOOD SCIENCE AND TECHNOLOGY 2157
 FORESTRY AND WILDLIFE 2161
 PLANT CULTURE 2165
 PLANT PATHOLOGY 2165
 RANGE MANAGEMENT 2167
 SOIL SCIENCE 2167
 WOOD TECHNOLOGY 2168
BIOLOGY 2168
 GENERAL 2168
 ANATOMY 2169
 ANIMAL PHYSIOLOGY 2169
 BIostatISTICS 2175
 BOTANY 2177
 CELL 2180
 ECOLOGY 2195
 ENTOMOLOGY 2207
 GENETICS 2210
 LIMNOLOGY 2221
 MICROBIOLOGY 2222
 MOLECULAR 2233
 NEUROSCIENCE 2266
 OCEANOGRAPHY 2288
 PLANT PHYSIOLOGY 2288
 VETERINARY SCIENCE 2289
 ZOOLOGY 2291

BIOPHYSICS 2294
 GENERAL 2294
 MEDICAL 2298
EARTH SCIENCES
 BIOGEOCHEMISTRY 2301
 GEOCHEMISTRY 2301
 GEODESY 2302
 GEOLOGY 2302
 GEOPHYSICS 2308
 HYDROLOGY 2310
 MINERALOGY 2312
 PALEOECOLOGY 2312
 PALEONTOLOGY 2313
 PALYNOLOGY 2313
 PHYSICAL GEOGRAPHY 2313
 PHYSICAL OCEANOGRAPHY 2313
HEALTH AND ENVIRONMENTAL SCIENCES
 ENVIRONMENTAL SCIENCES 2315
 HEALTH SCIENCES 2319
 GENERAL 2319
 AUDIOLOGY 2319
 DENTISTRY 2320
 EDUCATION 2321
 HEALTH CARE MANAGEMENT 2322
 HUMAN DEVELOPMENT 2327
 IMMUNOLOGY 2327
 MEDICINE AND SURGERY 2335
 MENTAL HEALTH 2337
 NURSING 2339
 NUTRITION 2348

OCCUPATIONAL HEALTH AND SAFETY.....	2352
ONCOLOGY	2353
OPHTHALMOLOGY.....	2355
PATHOLOGY.....	2356
PHARMACOLOGY.....	2358
PHARMACY.....	2364
PUBLIC HEALTH	2367
RADIOLOGY	2379
RECREATION	2380
REHABILITATION AND THERAPY.....	2381
SPEECH PATHOLOGY	2383
TOXICOLOGY.....	2384

PHYSICAL SCIENCES

PURE SCIENCES

CHEMISTRY.....	2387
GENERAL.....	2387
ANALYTICAL	2387
BIOCHEMISTRY.....	2393
INORGANIC.....	2408
ORGANIC.....	2414
PHARMACEUTICAL.....	2427
PHYSICAL.....	2428
POLYMER	2435
MATHEMATICS	2437
PHYSICS.....	2449
GENERAL.....	2449
ACOUSTICS	2450
ASTRONOMY AND ASTROPHYSICS	2450
ATMOSPHERIC SCIENCE.....	2453
ATOMIC.....	2455
CONDENSED MATTER.....	2457
ELECTRICITY AND MAGNETISM.....	2463
ELEMENTARY PARTICLES AND HIGH ENERGY	2463
FLUID AND PLASMA.....	2464
MOLECULAR.....	2465
NUCLEAR.....	2465
OPTICS	2466
RADIATION	2468
STATISTICS	2468

APPLIED SCIENCES

APPLIED MECHANICS.....	2472
COMPUTER SCIENCE.....	2472
ENGINEERING.....	2486
GENERAL.....	2486
AEROSPACE	2487

AGRICULTURAL.....	2491
AUTOMOTIVE.....	2492
BIOMEDICAL.....	2492
CHEMICAL.....	2500
CIVIL.....	2519
ELECTRONICS AND ELECTRICAL.....	2530
ENVIRONMENTAL	2567
INDUSTRIAL	2569
MATERIALS SCIENCE	2572
MECHANICAL.....	2585
METALLURGY.....	2597
MINING	2597
NUCLEAR.....	2598
PETROLEUM	2598
SYSTEM SCIENCE.....	2601
OPERATIONS RESEARCH.....	2602
TEXTILE TECHNOLOGY	2605

PSYCHOLOGY

PSYCHOLOGY.....	2607
GENERAL.....	2607
BEHAVIORAL	2608
CLINICAL.....	2610
COGNITIVE	2658
DEVELOPMENTAL	2665
EXPERIMENTAL.....	2672
INDUSTRIAL	2674
PERSONALITY	2682
PHYSIOLOGICAL.....	2683
PSYCHOBIOLOGY	2685
PSYCHOMETRICS	2688
SOCIAL	2689

Keyword Title Index.....	follows main text
Author Index	follows Keyword Title index

INTRODUCTION

Dissertation Abstracts International

Dissertation Abstracts International (DAI) is published monthly by ProQuest Information and Learning and includes abstracts of doctoral dissertations submitted to UMI by 550 participating institutions in North America and throughout the world.

Each author-prepared abstract, up to 350 words in length, describes in detail the original research project on which the dissertation is based. Most of the approximately 45,000 dissertations published by UMI each year are abstracted in *DAI* and may be purchased in microform or as paper copies.

DAI is published in three sections:

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- I — Communications and the Arts
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- IV — Philosophy, Religion and Theology
- V — Social Sciences

Section B—*The Sciences and Engineering*

- I — Biological Sciences
- II — Earth Sciences
- III — Health and Environmental Sciences
- IV — Physical Sciences
- V — Psychology

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Section C—*Worldwide* (formerly *European Abstracts*) is published quarterly and includes abstracts of dissertations in all disciplines accepted for doctoral and post-doctoral degrees at institutions throughout the world. Most of these dissertations are not available from UMI; those which are for sale are also listed in Section A or B. Beginning with Volume 50 (Spring 1989), *DAI—C* was expanded to include institutions worldwide.

Arrangement of Entries

Entries in *Dissertation Abstracts International* are grouped by author-selected subject. The subject categories are listed elsewhere in these introductory pages. Not every subject category will appear in every issue of *DAI*. Within each

category or subcategory, entries are arranged alphabetically by author.

Bibliographic Data

All bibliographic data relating to a dissertation appear at the head of an entry. The abstract then follows. Each entry contains the following essential information:

- Title
- Author's name
- Degree and date earned
- Institution granting the degree
- Number of pages in the original dissertation
- Reference to location of abstract in *DAI*
- Dissertation adviser
- UMI order number

Indexes

Each issue of *DAI* includes two indexes, both of which follow the main abstract text:

Keyword Index. A keyword is a significant word which appears in the dissertation title. Each keyword is followed in the index by citations in alphabetic sequence.

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Academic institutions join UMI's publishing program on an ongoing basis. Some schools publish all of their dissertations, while others choose to publish only current ones. Dissertations accepted by British institutions are made available through UMI in association with The British Library. A comprehensive list of participating institutions is located elsewhere in this introductory section.

UMI

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UMI Dissertation Services is a program of publishing, bibliographic, and copy services which enables the researcher to locate doctoral dissertations, and to acquire copies of those manuscripts published by UMI. The foundation on which these services are structured is UMI's comprehensive dissertation database, one of the largest and most widely used bibliographic information files in the world.

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UMI's dissertation database is a computerized file containing bibliographic citations to over 1.5 million North American doctoral dissertations dating back to 1861. In addition, citations to over 70,000 masters theses are included. More than 45,000 dissertation citations and 12,000 masters thesis citations are added to UMI's dissertation database each year. New citations are entered into the database each month.

There are a number of ways to search the dissertation database for citations. Following is a brief outline of UMI's Search Services.

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With access to BRS, Data-Star, Dialog®, OCLC EPIC, and STN® online information search services, researchers can conduct a direct and immediate search of UMI's dissertation database. Researchers can order dissertation copies directly through their terminal by using the DIALOG Dialorder service or BRS ORDER or the OCLC ILL subsystem.

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Researchers can now search the dissertation database independently—using *Dissertation Abstracts Ondisc*. *Dissertations Abstracts Ondisc* uses CD-ROM technology to provide information from over 1.5 million doctoral dissertations and masters theses. Researchers access this information using an IBM XT, AT, or compatible microcomputer with a minimum of 640 kb RAM.

Dissertation Abstracts Ondisc includes both bibliographic citations and 350-word abstracts for titles published since July 1980—just as they appear in *Dissertation Abstracts International*. In addition, bibliographic citations are included for dissertations prior to July 1980—dating as far back as 1861. Annual subscriptions and backfile discs are available. UMI adds approximately 55,000 new titles each year, with current abstracts delivered ondisc twice each year with your annual subscription.

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UMI's *Comprehensive Dissertation Index* is the definitive reference source for researchers who prefer to use a printed source to conduct their search. Available in most academic and institutional libraries, *CDI* is the only definitive printed reference to almost every doctoral dissertation accepted in North America since 1861. *CDI* supplements are published annually in both library-bound volumes and on microfiche.

The landmark 37-volume *CDI 1861-1972* lists more than 417,000 dissertations under keyword headings and within a separate author index. The *CDI Ten-Year Cumulation 1973-1982* cites nearly 351,000 dissertations in a 38-volume single-source reference and the *CDI Five-Year Cumulation 1983-1987* includes over 162,000 citations in 22 volumes. Together, these powerful bibliographic tools allow access to approximately 930,000 dissertations spanning more than 125 years with just *three* separate searches. *CDI* supplements are published annually in both library-bound volumes and on microfiche.

Dissertation Abstracts International is the authoritative source for concise, author-written summaries of current doctoral dissertations. Each abstract describes the dissertation in detail, enabling researchers to isolate and evaluate research trends. Monthly issues of *DAI* include approximately 3,500 abstracts grouped by subject and printed in two separate sections: Section A—*The Humanities and Social Sciences*, and Section B—*The Sciences and Engineering*. Section C—*Worldwide* (formerly *European Abstracts*)—is published quarterly.

Masters Abstracts International, published bimonthly, provides 150-word, author-prepared abstracts of master's theses.

American Doctoral Dissertations, published annually on an academic-year basis, is arranged by subject category, institution, and author. It is compiled for The Association of Research Libraries.

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Cinema
Dance
Design and Decorative Arts
Fine Arts
Information Science
Journalism
Landscape Architecture
Library Science
Mass Communications
Music
Speech Communication
Theater

Education

Education
General
Administration
Adult and Continuing
Agricultural
Art
Bilingual and Multicultural
Business
Community College
Curriculum and Instruction
Early Childhood
Educational Psychology
Elementary
Finance
Guidance and Counseling
Health
Higher
History of
Home Economics
Industrial
Language and Literature
Mathematics
Music
Philosophy of
Physical
Reading
Religious
Sciences
Secondary
Social Sciences
Sociology of
Special
Teacher Training
Technology

Tests and Measurements
Vocational

Language, Literature and Linguistics

Language
General
Ancient
Linguistics
Modern
Rhetoric and Composition
Literature
General
Classical
Comparative
Medieval
Modern
African
American
Asian
Canadian (English)
Canadian (French)
Caribbean
English
Germanic
Latin American
Middle Eastern
Romance
Slavic and East European

Philosophy, Religion and Theology

Philosophy
Religion
General
Biblical Studies
Clergy
History of
Philosophy of
Theology

Social Sciences

American Studies
Anthropology
Archaeology
Cultural
Physical
Business Administration
General
Accounting
Banking
Management
Marketing
Canadian Studies

Economics

General
Agricultural
Commerce-Business
Finance
History
Labor
Theory
Folklore
Geography
Gerontology
History
General
Ancient
Medieval
Modern
Black
Church
African
Asia, Australia and Oceania
Canadian
European
Latin American
Middle Eastern
United States
History of Science
Law
Political Science
General
International Law and Relations
Public Administration
Recreation
Social Work
Sociology
General
Criminology and Penology
Demography
Ethnic and Racial Studies
Individual and Family Studies
Industrial and Labor Relations
Public and Social Welfare
Social Structure and Development
Theory and Methods
Transportation
Urban and Regional Planning
Women's Studies

SUBJECT CATEGORIES

THE SCIENCES AND ENGINEERING

Biological Sciences

Agriculture
General
Agronomy
Animal Culture and Nutrition
Animal Pathology
Fisheries and Aquaculture
Food Science and Technology
Forestry and Wildlife
Plant Culture
Plant Pathology
Plant Physiology
Range Management
Soil Science
Wood Technology

Biology

General
Anatomy
Animal Physiology
Biostatistics
Botany
Cell
Ecology
Entomology
Genetics
Limnology
Microbiology
Molecular
Neuroscience
Oceanography
Veterinary Science

Zoology

Biophysics
General
Medical

Earth and Environmental Sciences

Biogeochemistry
Environmental Sciences
Geochemistry
Geodesy
Geology
Geophysics
Hydrology
Mineralogy
Paleobotany
Paleoecology
Paleontology
Paleozoology
Palynology
Physical Geography

Physical Oceanography

Health Sciences

Health Sciences

General
Audiology
Dentistry
Education
Health Care Management
Human Development
Immunology
Medicine and Surgery
Mental Health
Nursing
Nutrition
Obstetrics and Gynecology
Occupational Health and Safety
Oncology
Ophthalmology
Pathology
Pharmacology
Pharmacy
Public Health
Radiology
Recreation
Rehabilitation and Therapy
Speech Pathology
Toxicology
Home Economics

Physical Sciences

Pure Sciences

Chemistry
General
Agricultural
Analytical
Biochemistry
Inorganic
Nuclear
Organic
Pharmaceutical
Physical
Polymer
Radiation

Mathematics

Physics

General
Acoustics
Astronomy and Astrophysics
Atmospheric Science
Atomic
Condensed Matter

Electricity and Magnetism

Elementary Particles and High Energy
Fluid and Plasma
Molecular
Nuclear
Optics
Radiation
Statistics

Applied Sciences

Applied Mechanics
Computer Science
Engineering
General
Aerospace
Agricultural
Automotive
Biomedical
Chemical (includes ceramics and fuel)
Civil
Electronics and Electrical
Environmental
Industrial
Marine and Ocean
Materials Science
Mechanical
Metallurgy
Mining
Nuclear
Packaging
Petroleum
Sanitary and Municipal
System Science
Geotechnology
Operations Research
Plastics Technology
Textile Technology

Psychology

Psychology

General
Behavioral
Clinical
Cognitive
Developmental
Experimental
Industrial
Personality
Physiological
Psychobiology
Psychometrics
Social

PARTICIPATING

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The University of Alabama at Birmingham School of Public Health
The University of Alabama in Huntsville
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 Boston University School for the Arts
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 The Claremont Graduate University and San Diego State University
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Clark University
 Clark Atlanta University
 Clarkson University
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 University of Colorado at Colorado Springs
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 University of Colorado Health Sciences Center
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 Colorado School of Mines
 Colorado Technical University
 Columbia University
 Columbia University Teachers College
 Columbia University under the Faculty of Union Theological Seminary in the City of New York
 Columbia University Teachers College under the Faculty of Union Theological Seminary in the City of New York
 Columbia Theological Seminary
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 University of Detroit Mercy
 Universidad de Deusto (Spain)
 Dominican House of Studies
 Universität Dortmund (Germany)
 Dowling College
 Drake University
 Drew University
 Drexel University

Drexel University College of Medicine
 Drexel University College of Nursing and Health Professions
 The Dropsie College
 University of Dublin (Ireland)
 University of Dubuque Theological Seminary
 Duke University
 University of Dundee (United Kingdom)
 Dundee College of Technology (United Kingdom)
 Duquesne University
 University of Durham (United Kingdom)

University of East Anglia (United Kingdom)
 East Carolina University
 The Eastern Baptist Theological Seminary
 Eastern Mediterranean University (Cyprus)
 Eberhard-Karls-Universität Tübingen (Germany)
 Ecole de Technologie Supérieure (Canada)
 Eden Theological Seminary
 University of Edinburgh (United Kingdom)
 Edith Cowan University (Australia)
 Universidad Nacional de Educación a Distancia (Spain)
 Katholische Universität Eichstätt (Germany)
 Technische Universiteit Eindhoven (The Netherlands)
 Emerson College
 Emmanuel College of Victoria University (Canada)
 Emory University
 Emporia State University
 Erasmus Universiteit Rotterdam (The Netherlands)
 Erskine Theological Seminary
 University of Essex (United Kingdom)
 Ethniko Metsovio Polytechnio (Greece)
 Institut Européen d'Administration des Affaires (France)
 University of Exeter (United Kingdom)

Fairleigh Dickinson University
 Universidad Nacional 'Federico Villarreal' (Peru)
 Fielding Graduate Institute
 The Fielding Institute
 Fletcher School of Law and Diplomacy (Tufts University)
 Flinders University of South Australia (Australia)
 University of Florida
 University of Central Florida
 University of North Florida
 University of South Florida
 The Florida State University
 Florida Atlantic University
 Florida Atlantic University and University of Central Florida
 Florida International University
 Florida Institute of Technology
 Fordham University
 Forest Institute of Professional Psychology
 Free University (The Netherlands) and Institute for Christian Studies (Canada)
 Universität Fridericiana Karlsruhe (Germany)
 Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany)
 Fukui University (Japan)
 Fuller Theological Seminary, Doctor of Ministry Program
 Fuller Theological Seminary, Doctor of Ministry Korean Program
 Fuller Theological Seminary, School of Psychology
 Fuller Theological Seminary, School of Theology
 Fuller Theological Seminary, School of Intercultural Studies
 International University of Fundamental Studies (Russia)

Gallaudet University

Gannon University
 Garrett-Evangelical Theological Seminary
 Garrett-Evangelical Theological Seminary in Cooperation with
 Northwestern University
 Faculté Universitaire des Sciences Agronomiques de Gembloux
 (Belgium)
 The General Theological Seminary
 Université de Genève (Switzerland)
 Rijksuniversiteit Gent (Belgium)
 Georg-August-Universität zu Göttingen (Germany)
 George Fox University
 George Fox University, George Fox Evangelical Seminary
 George Mason University
 The George Washington University
 Georgetown University
 Georgetown University Medical Center
 University of Georgia
 Georgia Southern University
 Georgia State University
 State University of West Georgia
 Georgia Institute of Technology
 Georgia Institute of Technology, The George W. Woodruff School
 of Mechanical Engineering
 Georgia School of Professional Psychology
 University of Ghana (Ghana)
 University of Glasgow (United Kingdom)
 Golden Gate University
 Golden Gate Baptist Theological Seminary
 Gonzaga University
 Gorakhpur University (India)
 Göteborgs Universitet (Sweden)
 Grace Theological Seminary
 Graduate Theological Union
 Graduate Theological Union and University of California,
 Berkeley
 Grambling State University
 Universidad de Granada (Spain)
 Université Stendhal Grenoble 3 (France)
 Griffith University (Australia)
 Rijksuniversiteit Groningen (The Netherlands)
 University of Guelph (Canada)
 South Gujarat University, Surat (India)

Hacettepe Üniversitesi (Turkey)
 FernUniversität in Hagen (Germany)
 Hahnemann University Graduate School
 University of Haifa (Israel)
 Universität Hamburg (Germany)
 Technische Universität Hannover (Germany)
 University of Hartford
 Hartford Seminary
 Harvard University
 Hatfield Polytechnic (United Kingdom)
 University of Hawai'i
 University of Hawai'i at Hilo
 Hebrew Union College - Jewish Institute of Religion (California)
 Hebrew Union College - Jewish Institute of Religion (New York)
 Hebrew Union College - Jewish Institute of Religion (Ohio)
 Helsingin Kauppakorkeakoulu (Finland)
 Helsingin Yliopisto (Finland)
 Teknillinen Korkeakoulu (Helsinki) (Finland)
 Heriot-Watt University (United Kingdom)
 The Herman M. Finch University of Health Sciences - The
 Chicago Medical School

Herziah - Jewish Teachers Seminary and People's University
 Himeji Institute of Technology (Japan)
 Hiroshima University (Japan)
 Hitotsubashi University (Japan)
 Hofstra University
 Hokkaido University (Japan)
 University of Hong Kong (People's Republic of China)
 Hong Kong Polytechnic University (People's Republic of China)
 Hong Kong University of Science and Technology (People's
 Republic of China)
 University of Houston
 Howard University
 Howard University School of Social Work
 Universidad de Huelva (Spain)
 University of Hull (United Kingdom)

University of Ibadan (Nigeria)
 University of Idaho
 Idaho State University
 The Iliff School of Theology
 The Iliff School of Theology and University of Denver
 University of Illinois at Chicago
 University of Illinois at Chicago, Health Sciences Center
 University of Illinois at Chicago, Health Sciences Center, School
 of Public Health
 University of Illinois at Springfield
 University of Illinois at Urbana-Champaign
 Illinois State University
 Northern Illinois University
 Southern Illinois University at Carbondale
 Southern Illinois University at Edwardsville
 Illinois Institute of Technology
 Illinois School of Professional Psychology
 Immaculata College
 Universidad Inca Garcilaso de La Vega y Universidad Nacional
 Federico Villarreal (Peru)
 University of the Incarnate Word
 Indian Institute of Management (I) (India)
 Indian Institute of Science (India)
 Indian Institute of Technology, Kanpur (India)
 Indian Institute of Technology, Madras (India)
 Indiana University
 Indiana University, Graduate School of Business
 Indiana University School of Nursing
 Indiana State University
 Indiana University of Pennsylvania
 Institute of Transpersonal Psychology
 Instituto Politécnico Nacional (Mexico)
 Inter-American University of Puerto Rico (Puerto Rico)
 Interdenominational Theological Center
 International College
 International Christian University (Japan)
 University of Ioannina (Greece)
 The University of Iowa
 University of Northern Iowa
 Iowa State University
 National University of Ireland (Ireland)
 Irkutsk State University (Russia)
 Istanbul Teknik Üniversitesi (Turkey)

Jackson State University
 Jadavpur University (India)
 Jai Narain Vyas University (India)
 James Cook University (Australia)

James Madison University
 The Hebrew University of Jerusalem (Israel)
 The Jewish Theological Seminary of America
 The Jewish Theological Seminary of America, Cantors Institute
 Northern Jiaotong University (People's Republic of China)
 Jichi Medical School (Japan)
 Johannes Kepler Universität Linz (Austria)
 John F. Kennedy University
 The Johns Hopkins University
 The Johns Hopkins University, School of Public Health and
 Hygiene
 Johnson & Wales University
 József Attila Tudományegyetem (Hungary)

Kanazawa University (Japan)
 University of Kansas
 University of Kansas in Cooperation with Victorian College of
 Pharmacy (Australia)
 University of Kansas in Cooperation with Wichita State
 University
 Kansas State University
 Karl-Franzens Universität Graz (Austria)
 Karolinska Institutet (Sweden)
 Keele University (United Kingdom)
 Keio University (Japan)
 University of Kent at Canterbury (United Kingdom)
 Kent State University
 University of Kentucky
 University of Kerala (India)
 King Fahd University of Petroleum and Minerals (Saudi Arabia)
 Queen's University at Kingston (Canada)
 Universität Klagenfurt (Austria)
 Kobe University (Japan)
 Universität zu Köln (Germany)
 Kokugakuin University (Japan)
 The Korea Advanced Institute of Science (Republic of Korea)
 Korea Advanced Institute of Science and Technology (Republic of
 Korea)
 Kungliga Tekniska Högskolan (Sweden)
 Kurukshetra University (India)
 Kyorin University (Japan)
 Kyoto University (Japan)
 Kyoto Institute of Technology (Japan)
 Kyushu University (Japan)

Lakehead University (Canada)
 Lalit Narayan Mithila University (India)
 Lamar University - Beaumont
 Landbouwwuniversiteit Wageningen (The Netherlands)
 Lancaster University (United Kingdom)
 Lancaster Theological Seminary
 La Sierra University
 Universidad de Las Palmas de Gran Canaria (Spain)
 La Trobe University (Australia)
 Laurence University (California)
 Université de Lausanne (Switzerland)
 Business School Lausanne (Switzerland)
 Ecole Polytechnique Fédérale de Lausanne (Switzerland)
 Université Laval (Canada)
 University of La Verne
 University of Leeds (United Kingdom)
 Lehigh University
 University of Leicester (United Kingdom)
 Rijksuniversiteit Leiden (The Netherlands)

Leopold-Franzens Universität Innsbruck (Austria)
 Lesley University
 Katholieke Universiteit Leuven (Belgium)
 Université de l'Etat à Liège (Belgium)
 Université de Lille 2 (Droit et Santé) (France)
 Limburgs Universitair Centrum (Belgium)
 Linköpings Universitet (Sweden)
 The University of Liverpool (United Kingdom)
 Univerza v Ljubljani (Slovenia)
 Loma Linda University
 University of London (United Kingdom)
 University of London, Goldsmiths' College (United Kingdom)
 University of London, King's College (United Kingdom)
 University of London, University College (United Kingdom)
 London School of Economics and Political Science (United
 Kingdom)
 The City University (London) (United Kingdom)
 Polytechnic of Central London (United Kingdom)
 Long Island University, The Brooklyn Center
 University of Technology, Loughborough (United Kingdom)
 University of Louisiana at Lafayette
 University of Louisiana at Monroe
 Louisiana State University and Agricultural & Mechanical
 College
 Louisiana State University Health Sciences Center
 Louisiana State University Health Sciences Center School of
 Medicine
 Louisiana State University Health Sciences Center School of
 Nursing
 Louisiana State University Health Sciences Center - Shreveport
 Northeast Louisiana University
 Northwestern State University of Louisiana
 University of Southwestern Louisiana
 Louisiana Tech University
 University of Louisville
 Université Catholique de Louvain (Belgium)
 Loyola University, New Orleans
 Loyola University of Chicago
 Loyola University of Chicago, School of Social Work
 Loyola College in Maryland
 Ludwig-Maximilians-Universität München (Germany)
 Lunds Universitet (Sweden)
 Luther Northwestern Theological Seminary
 Luther Seminary
 Lutheran School of Theology at Chicago
 Lynn University
 Université Lumière Lyon 2 (France)

Maastricht School of Management (The Netherlands)
 Universidade de Macau (People's Republic of China)
 Macquarie University (Australia)
 Universidad Autónoma de Madrid (Spain)
 Universidad Complutense de Madrid (Spain)
 Universidad Politécnica de Madrid (Spain)
 Madurai Kamaraj University (India)
 Maharishi University of Management
 Maharaja Sayajirao University of Baroda (India)
 Mahatma Phule Krishi Vidyapeeth (India)
 The University of Maine
 Universidad de Málaga (Spain)
 The University of Manchester (United Kingdom)
 The University of Manchester Institute of Science and Technology
 (United Kingdom)
 Manchester Business School (United Kingdom)

Manchester Polytechnic (United Kingdom)
 Manhattan School of Music
 The University of Manitoba (Canada)
 Universität Mannheim (Germany)
 Marquette University
 Marshall University
 University of Maryland, Baltimore
 University of Maryland Baltimore County
 University of Maryland College Park
 University of Maryland, Eastern Shore
 Marywood University
 University of Massachusetts Amherst
 University of Massachusetts Boston
 University of Massachusetts Lowell
 University of Massachusetts Medical School
 University of Massachusetts, Amherst, Hampshire,
 Mount Holyoke and Smith Colleges
 University of Massachusetts and Mount Holyoke College
 Massachusetts College of Pharmacy and Health Sciences
 Massachusetts Institute of Technology
 Massachusetts School of Professional Psychology
 Massey University (New Zealand)
 McCormick Theological Seminary
 McGill University (Canada)
 McMaster University (Canada)
 McNeese State University
 MCP Hahnemann University
 Medical College of Georgia
 Medical College of Ohio at Toledo
 The Medical College of Pennsylvania
 Medical University of South Carolina
 Medical University of South Carolina - College of Health
 Professions
 The Medical College of Wisconsin
 University of Medicine and Dentistry of New Jersey Graduate
 School of Biomedical Sciences
 Meerut University (India)
 Meharry Medical College
 University of Melbourne (Australia)
 Melbourne College of Divinity (Australia)
 The University of Memphis
 Memphis State University
 Mercer University
 Universidad Nacional Autónoma de México (Mexico)
 University of Miami
 Miami University
 Miami Institute of Psychology of the Caribbean Center for
 Advanced Studies
 University of Michigan
 University of Michigan College of Engineering Graduate
 Professional Programs
 University of Michigan, Law School
 University of Michigan, School of Public Health
 Michigan State University
 Michigan Technological University
 Central Michigan University
 Eastern Michigan University
 Western Michigan University
 Mid-America Baptist Theological Seminary
 Middlebury College
 Università degli Studi di Milano (Italy)
 The Milltown Institute (Ireland)
 University of Minnesota
 Minnesota School of Professional Psychology

The University of Mississippi
 The University of Mississippi Medical Center
 The University of Southern Mississippi
 Mississippi State University
 University of Missouri - Columbia
 University of Missouri - Kansas City
 University of Missouri - Rolla
 University of Missouri - Saint Louis
 Universitatea de Stat din Moldova (Moldova)
 Momoyama Gakuin University (Japan)
 Monash University (Australia)
 Université de Moncton (Canada)
 University of Montana
 Montana State University
 Instituto Tecnológico y de Estudios Superiores de Monterrey
 (Mexico)
 Université de Montpellier I (France)
 Université de Montpellier II (Sciences et Techniques du
 Languedoc) (France)
 Université de Montréal (Canada)
 Ecole Polytechnique, Montréal (Canada)
 Morgan State University
 Technische Universität München (Germany)
 Universidad de Murcia (Spain)
 Murdoch University (Australia)
 Nagaoka University of Technology (Japan)
 Nagoya University (Japan)
 Université de Nantes (France)
 University of Natal (South Africa)
 National College of Education
 National Institute of Development Administration (Thailand)
 National-Louis University
 Universidad de Navarra (Spain)
 Universidad Pública de Navarra (Spain)
 The University of Nebraska - Lincoln
 University of Nebraska at Omaha
 University of Nebraska Medical Center
 Université de Neuchâtel (Switzerland)
 University of Nevada, Las Vegas
 University of Nevada, Reno
 The University of New Brunswick (Canada)
 University of New Hampshire
 University of New Haven
 New Jersey Institute of Technology
 The University of New Mexico
 New Mexico State University
 New Mexico Highlands University
 New Mexico Institute of Mining and Technology
 University of New Orleans
 New Orleans Baptist Theological Seminary
 New School University
 New School for Social Research
 University of New South Wales (Australia)
 New York University
 New York University, Graduate School of Business
 Administration
 New York University, School of Engineering and Science
 Mount Sinai School of Medicine of New York University
 New York Medical College
 State University of New York at Albany
 State University of New York at Binghamton
 State University of New York at Buffalo
 State University of New York at Stony Brook

State University of New York College of Environmental Science
 & Forestry
 State University of New York Health Science Center at Brooklyn
 State University of New York Health Science Center at Syracuse
 State University of New York College of Optometry
 University of Newcastle (Australia)
 University of Newcastle Upon Tyne (United Kingdom)
 Memorial University of Newfoundland (Canada)
 Nihon University (Japan)
 Katholieke Universiteit Nijmegen (The Netherlands)
 North American Baptist Seminary
 The University of North Carolina at Chapel Hill
 The University of North Carolina at Charlotte
 The University of North Carolina at Greensboro
 North Carolina State University
 The University of North Dakota
 North Dakota State University
 Northcentral University
 Northeastern University
 Northern Territory University (Australia)
 Northwestern University
 University of Notre Dame
 Facultés Universitaires Notre-Dame de la Paix (Belgium)
 The University of Nottingham (United Kingdom)
 Nova University
 Nova University School of Psychology
 Nova Southeastern University
 Technical University of Nova Scotia (Canada)

Oakland University
 Occidental College
 Ochanomizu University (Japan)
 Odense Universitet (Denmark)
 OGI School of Science & Engineering
 Ohio University
 The Ohio State University
 The Ohio State University in Cooperation with Miami University
 The University of Oklahoma
 The University of Oklahoma Health Sciences Center
 Oklahoma State University
 Old Dominion University
 The University of Western Ontario (Canada)
 Open University (United Kingdom)
 Oral Roberts University
 University of Oregon
 Oregon State University
 Oregon Graduate Institute of Science and Technology
 Oregon Health Sciences University
 Osaka University (Japan)
 Osaka City University (Japan)
 Osaka Prefecture University (Japan)
 Universitetet i Oslo (Norway)
 Universität Osnabrück (Germany)
 University of Otago (New Zealand)
 University of Ottawa (Canada)
 University of Ottawa in Cooperation with Saint Paul University
 (Canada)
 Otto-Friedrich-Universität Bamberg (Germany)
 Oulun Yliopisto (Finland)
 Our Lady of the Lake University
 Universidad de Oviedo (Spain)
 Federal University of Technology Owerri (Nigeria)
 University of Oxford (United Kingdom)
 Oxford Centre for Mission Studies (United Kingdom)

Pace University
 University of the Pacific
 Pacific University Oregon Graduate School of Professional
 Psychology
 Pacific Graduate School of Psychology
 Pacific School of Religion
 Pacific Western University
 Pacifica Graduate Institute
 Universität-Gesamthochschule Paderborn (Germany)
 Panjab University (India)
 The Institute of Paper Chemistry
 Institute of Paper Science and Technology
 Université de Paris III (Sorbonne-Nouvelle) (France)
 Université de Paris IV (Paris-Sorbonne) (France)
 Université de Paris VI (Pierre et Marie Curie) (France)
 Université de Paris VII (Denis Diderot) (France)
 Université de Paris VIII - Vincennes à St-Denis (France)
 Université de Paris IX (Paris-Dauphine) (France)
 Université de Paris X (Paris-Nanterre) (France)
 Université de Paris XI (Paris-Sud) (France)
 Peabody College for Teachers of Vanderbilt University
 Peabody Institute of the Johns Hopkins University
 University of Pennsylvania
 University of Pennsylvania School of Nursing
 The Pennsylvania State University
 Pepperdine University
 Philadelphia College of Pharmacy and Science
 University of the Philippines (The Philippines)
 Philipps-Universität Marburg (Germany)
 University of Pittsburgh
 Pittsburgh Theological Seminary
 Polska Akademia Nauk (PAN) (Poland)
 Polytechnic University
 Pontificia Università Gregoriana (The Vatican)
 Pontificia Universitas Lateranensis (The Vatican)
 Pontificia Università S. Tommaso d'Aquino (The Vatican)
 Pontificio Ateneo Antonianum (The Vatican)
 University of Poona (India)
 University of Port Elizabeth (South Africa)
 University of Portland
 Portland State University
 Portland State University and University of Oregon
 Portland State University, Oregon State University and University
 of Oregon
 Potchefstroom University for Christian Higher Education (South
 Africa)
 Presbyterian School of Christian Education
 University of Pretoria (South Africa)
 Princeton University
 Princeton Theological Seminary
 Providence College
 University of Puerto Rico, Mayaguez (Puerto Rico)
 University of Puerto Rico, Rio Piedras (Puerto Rico)
 University of Puerto Rico Medical Sciences (Puerto Rico)
 Purdue University
 Université du Québec (Canada)
 Université du Québec à Chicoutimi (Canada)
 University of Queensland (Australia)
 Queensland University of Technology (Australia)
 Radcliffe College
 The RAND Graduate School
 University of Reading (United Kingdom)

University of Redlands
Reformed Theological Seminary
Regent University
The University of Regina (Canada)
Regis College (Canada)
Université René Descartes (Paris 5) (France)
Rensselaer Polytechnic Institute
Rheinische-Westfälische Technische Hochschule
Aachen (Germany)
Rheinische Friedrich-Wilhelms-Universität Bonn (Germany)
University of Rhode Island
Rice University
Sveučilište u Rijeci (Croatia)
Universidade Federal do Rio de Janeiro (Brazil)
Universidad de la Rioja (Spain)
Robert Morris University
The University of Rochester
The University of Rochester, Eastman School of Music
University of Rochester School of Nursing
The Rockefeller University
Università degli Studi 'La Sapienza' (Rome) (Italy)
Rowan University
Royal College of Art (United Kingdom)
Royal Melbourne Institute of Technology (Australia)
Royal Military College of Canada (Canada)
Royal Veterinary College of Sweden (Sweden)
Ruhr Universität Bochum (Germany)
Ruprecht-Karls-Universität Heidelberg (Germany)
Rush University
Rush University, College of Health Sciences
Rush University, College of Nursing
Russian Academy of Sciences (Russia)
Rutgers The State University of New Jersey - New Brunswick
Rutgers The State University of New Jersey - New Brunswick and
University of Medicine and Dentistry of New Jersey
Rutgers The State University of New Jersey - Newark
Rutgers The State University of New Jersey, Graduate School of
Applied and Professional Psychology
Ryerson University (Canada)

Universität des Saarlandes (Germany)
Sackler School of Graduate Biomedical Sciences (Tufts
University)
Universiti Sains Malaysia (Malaysia)
St. Ambrose University
University of St. Andrews (United Kingdom)
Saint Bonaventure University
St. Francis Xavier University (Canada)
Universität St. Gallen -- Hochschule für Wirtschafts-, Rechts- und
Sozialwissenschaften (Switzerland)
St. John's University (New York)
St. John's University (New York), School of Education and
Human Services
St. John's University (New York), School of Pharmacy
Saint Joseph's University
Saint Louis University
Saint Mary Seminary and Graduate School of Theology
St. Mary's Seminary and University
St. Mary's University of San Antonio
University of St. Michael's College (Canada)
Institute of Christian Thought, University of St. Michael's College
(Canada)
College of Saint Paul and Saint Mary (United Kingdom)
The Saint Paul Seminary

St. Stephen's College (Canada)
University of St. Thomas (Houston)
University of St. Thomas (Minnesota)
St. Thomas Institute
Saitama University (Japan)
University of Salford (United Kingdom)
Escuela de Salud Pública de México, Instituto Nacional de Salud
Pública (Mexico)
Salve Regina University
Sam Houston State University
University of San Carlos (The Philippines)
University of San Diego
University of San Francisco
San Francisco State University
San Francisco Theological Seminary
Universidad de San José (Costa Rica)
Santa Clara University
University of Santo Tomás (The Philippines)
Universidade de São Paulo (Brazil)
University of Sarasota
The University of Saskatchewan (Canada)
University of Saugar (India)
Saybrook Graduate School and Research Center
University of the Sciences in Philadelphia
Ecole des Hautes Etudes en Sciences Sociales (France)
The Scripps Research Institute
Seattle University
Seattle Pacific University
Semmelweis Egyetem (Hungary)
Seton Hall University
Seton Hall University, School of Education
Seton Hall University, College of Education and Human Services
Seton Hall University and The University of Medicine and
Dentistry of New Jersey
Universidad de Sevilla (Spain)
University of Sheffield (United Kingdom)
Shenandoah University
Université de Sherbrooke (Canada)
Shizuoka University (Japan)
Simmons College
Simmons College School of Social Work
Simon Fraser University (Canada)
Universitaire Faculteiten Sint-Ignatius te Antwerpen (Belgium)
University of Skopje (Macedonia)
Smith College
Smith College School for Social Work
University of South Africa (South Africa)
South Bank University (United Kingdom)
University of South Carolina
University of South Carolina with Medical University of South
Carolina
South Carolina State University
University of South Dakota
South Dakota State University
South Dakota School of Mines and Technology
University of Southampton (United Kingdom)
Southeastern Baptist Theological Seminary
The Southern Baptist Theological Seminary
Southern Cross University (Australia)
Southern Methodist University
Southern University and Agricultural and Mechanical College
Southwestern Baptist Theological Seminary
Spalding University
Springfield College

Stanford University
Universiteit Stellenbosch (South Africa)
Stephen F. Austin State University
Stevens Institute of Technology
University of Stirling (United Kingdom)
Handelshögskolan i Stockholm (Sweden)
Stockholms Universitet (Sweden)
Université de Strasbourg II Marc Bloch (Sciences Humaines)
(France)
Université de Strasbourg III (Université Robert Schuman)
(France)
University of Strathclyde (United Kingdom)
Universität Stuttgart (Germany)
Sunderland Polytechnic (United Kingdom)
Universidad Nacional del Sur (Argentina)
University of Surrey (United Kingdom)
University of Sussex (United Kingdom)
University of Sydney (Australia)
University of Technology, Sydney (Australia)
University of Western Sydney Macarthur (Australia)
Syracuse University

Taideteollinen Korkeakoulu (Finland)
University of Tasmania (Australia)
Technion - Israel Institute of Technology (Israel)
Tel-Aviv University (Israel)
Temple University
The University of Tennessee
The University of Tennessee Center for the Health Sciences
Tennessee State University
East Tennessee State University
Middle Tennessee State University
Tennessee Technological University
The University of Texas at Arlington
The University of Texas at Austin
The University of Texas at Dallas
The University of Texas at El Paso
The University of Texas at San Antonio
The University of Texas Graduate School of Biomedical Sciences
at Galveston
The University of Texas Health Science Center at Houston
Graduate School of Biomedical Sciences
The University of Texas Health Science Center at Houston School
of Nursing
The University of Texas Health Science Center at Houston School
of Public Health
The University of Texas Health Science Center at San Antonio
The University of Texas Southwestern Medical Center at Dallas
The University of Texas System School of Nursing
Texas A&I University
Texas A&M University
Texas A&M University - Commerce
Texas A&M University - Corpus Christi
Texas A&M University - Corpus Christi and Texas A&M
University - Kingsville
Texas A&M University - Kingsville
The Texas A&M University System Health Science Center
Texas Christian University
Texas Southern University
Texas State University - San Marcos
Texas Tech University
Texas Woman's University
East Texas State University
University of North Texas

University of North Texas Health Science Center at Fort Worth
Thammasat University (Thailand)
Thomas Jefferson University
Tohoku University (Japan)
University of Tokushima (Japan)
University of Tokyo (Japan)
Tokyo Denki University (Japan)
Tokyo Institute of Technology (Japan)
Tokyo Metropolitan University (Japan)
Tokyo University of Agriculture and Technology (Japan)
Tokyo University of Science (Japan)
The University of Toledo
University of Toronto (Canada)
Toronto School of Theology (Canada)
Institut National des Sciences Appliquées de Toulouse (France)
Touro University International
Trent University (Canada)
University of Trinity College (Canada)
Trinity College and Seminary in Cooperation with the University
of Liverpool (United Kingdom)
Trinity Evangelical Divinity School
Universitetet i Trondheim (Norway)
Universitetet i Trondheim Norges Tekniske Høgskole (Norway)
National Tsing Hua University (Taiwan)
University of Tsukuba (Japan)
Universidad Nacional de Tucuman (Argentina)
Tufts University
Tulane University
Tulane University, School of Engineering
Tulane University, School of Public Health and Tropical
Medicine
Tulane University, School of Social Work
The University of Tulsa
Turun Yliopisto (Finland)
Turun Kauppakorkeakoulu (Finland)
Universiteit Twente (The Netherlands)

Ukrainische Freie Universität (Germany)
Universität Ulm (Germany)
University of Ulster (United Kingdom)
Umeå Universitet (Sweden)
Uniformed Services University of the Health Sciences
Union College (New York)
The Union for Experimenting Colleges and Universities
The Union Institute
Union Institute & University
Union Theological Seminary
Union Theological Seminary in Virginia
Union Theological Seminary & Presbyterian School of Christian
Education
United States International University
United States Sports Academy
United Theological Seminary
Uppsala Universitet (Sweden)
The University of Utah
Utah State University
Universiteit Utrecht (The Netherlands)

Valdosta State University
Universidad Politécnica de Valencia (Spain)
Universidad de Valladolid (Spain)
Vanderbilt University
Vanderbilt University Divinity School
Vanderbilt University Graduate School of Management

Unibertsitatea del País Vasco/Euskal Herriko Unibertsitatea (Spain)
 Instituto Venezolano de Investigaciones Cientificas (Venezuela)
 The University of Vermont and State Agricultural College
 Université Victor Segalen Bordeaux 2 (France)
 University of Victoria (Canada)
 Victoria University (Australia)
 Universidad de Vigo (Spain)
 Villanova University
 University of Virginia
 Virginia Commonwealth University
 Virginia Commonwealth University/Medical College of Virginia
 Virginia Consortium for Professional Psychology (Old Dominion University)
 Virginia Polytechnic Institute and State University

Wageningen Universiteit en Researchcentrum (The Netherlands)
 University of Waikato (New Zealand)
 Wake Forest University
 Wake Forest University, The Bowman Gray School of Medicine
 Walden University
 The University of Wales (United Kingdom)
 University of Wales, Aberystwyth (United Kingdom)
 University of Wales, Bangor (United Kingdom)
 University of Wales College of Cardiff (United Kingdom)
 University of Wales Institute, Cardiff (United Kingdom)
 University of Wales, Swansea (United Kingdom)
 Polytechnic of Wales (United Kingdom)
 Politechnika Warszawska (Poland)
 Uniwersytet Warszawski (Poland)
 University of Warwick (United Kingdom)
 Waseda University (Japan)
 University of Washington
 Washington State University
 Washington University
 University of Waterloo (Canada)
 Wayne State University
 Webster University
 The Weizmann Institute of Science (Israel)
 Wellcome Research Laboratories (United Kingdom)
 Wesleyan University
 University of the West Indies (Trinidad and Tobago)
 West Virginia University
 University of Western Australia (Australia)
 Western Carolina University
 Western Conservative Baptist Seminary
 Western Theological Seminary
 Westfälische Wilhelms-Universität Münster (Germany)
 Westminster College (United Kingdom)
 Westminster Theological Seminary
 Wichita State University
 Widener University
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DISSERTATION ABSTRACTS INTERNATIONAL

BIOLOGICAL SCIENCES

AGRICULTURE, GENERAL

Changes in the agricultural system of La Rioja in the 20th century. Garcia Santa Maria, Teresa, Dr., *Universidad de la Rioja (Spain)*, 2003. 689pp. ISBN: 0-493-49817-6. Director: Jesus Alonso Castroviejo. In Spanish.

Order Number DA3134237

This paper is focused on the analysis of agricultural plots in La Rioja, particularly small family plots, and the changes they have undergone as a consequence of the changes in Spanish agriculture, which it has gone from a subsistence sector to a market, diversified, competitive and modern industrial model where small plots are increasingly less relevant in the overall agricultural system.

First, we studied the sources, basically the Agricultural Censuses of 1962, 1972, 1982, 1989 and 1999, as well as the Agricultural Statistics of the Autonomous Community of La Rioja. The analyses of the censuses were put into context considering the current situation and changing socioeconomic characteristics of Spanish society and the relationships with wider circles, as the differences in the collection of data for each Census forced us to use this frame of reference.

Then, we retrieved general, regional and local data for the variables included in the Censuses. We focused particularly on two variables: the titleholder of the land and the crops since these variables reflect the evolution of the agricultural system in La Rioja over the last three decades of the 20th century.

The differences in the values for the titleholders and predominant crops showed a *regionalization* of the agricultural sector in La Rioja: 11 sub-regions were defined for the three regions of the *Depression*, an area that concentrates about 100% of the agricultural land in La Rioja and also has its own problems and growth potential.

In spite of the regional differences, it can be claimed that La Rioja is dominated by a majority presence of small and medium-size highly developed family plots faced with viability and profitability problems, but particularly with problems related to generational transfer in terms of model preservation.

The future of family agricultural plots in La Rioja is complex and difficult, albeit interesting, both at economic and socio-cultural level.

AGRICULTURE, AGRONOMY

Narrow row corn production in Wyoming. Alford, Craig, Ph.D., *University of Wyoming*, 2004. 110pp. Adviser: Stephen D. Miller
Order Number DA3132815

Studies were conducted at Torrington, Wyoming from 2001 to 2003 to determine the effect of row spacing, plant population, and herbicide treatment on corn production, weed control, and weed biomass production. Additional studies were conducted at Torrington and Pine Bluffs to determine

if there were any corn hybrids specifically adapted to narrow row production. Reducing row spacing did not negatively impact corn grain or silage production; in some cases yields were increased in narrow rows. Reducing row spacing resulted in less weed biomass production primarily due to increased light interception by corn in narrow rows which made less light available to weeds. Row spacing did not impact weed control. Increasing corn populations above currently recommend levels did not increase grain yield or reduce weed biomass. Increasing population did result in increased weed control. Glyphosate-based herbicide treatments provided better weed control than did glufosinate treatments; however, a pre-emergence application of metolachlor/atrazine provided the best weed control in both years of the study. Treatments with reduced herbicide inputs did not provide the level of weed control that was observed with full input treatments. None of the corn hybrids tested appeared to be specifically adapted to narrow row production.

Overall, reducing corn row spacing did not negatively impact yields and, in some cases, yields were improved in narrow rows. Besides yield effects there were secondary benefits from reduced row spacing such as reduced weed growth and improved light interception. Finally, if growers adopt narrow row production for sugarbeets, where substantial yield benefits have been observed, they could use the same equipment in corn without a yield penalty.

Nitrogen use efficiency of cotton following corn in rotation and foliar fertilization of cotton using leaf blade analysis. Craig, Charles Chism, Jr., Ph.D., *Louisiana State University and Agricultural & Mechanical College*, 2002. 139pp. Director: Charles Kennedy
Order Number DA3134920

Research is needed to ensure proper cotton N fertilization in various production practices without the detrimental effects of excess fertilization on yield and the environment.

The objectives were (i) to evaluate the effect of residual N on the uptake efficiency of cotton-applied N when following corn in rotation, (ii) evaluate the potential for using leaf blade analysis and preset N thresholds to trigger foliar applications of N to cotton grown on clay soils and (iii) evaluate the effect of preplant N on early root and shoot growth and N assimilation of cotton grown on a clay soil.

Nitrogen rates of 0, 56 and 112 kg N ha⁻¹ as double labeled 5 atom% ¹⁵N NH₄NO₃- were applied to cotton grown on Commerce silt loam (fine-silty, mixed, nonacid, thermic Aeric Fluvaquent) following previous corn N rates of 0, 168 and 280 kg N ha⁻¹. Total dry matter accumulation, total N assimilation and seedcotton yield on the upper third of the plant increased as corn- and cotton-applied N increased. Recovery of labeled N ranged from 40-53% in 1999 and 30-58% in 2000 and was highest following 0 or 168 kg N ha⁻¹ previous corn-applied N in both years. More plant N assimilation was soil-derived in both years following 280 kg corn-applied N ha⁻¹. Application of 112 kg N ha⁻¹ resulted in the most ¹⁵N assimilated but uptake efficiency was the lowest. Seedcotton yields of cotton grown on Sharkey clay (very fine, montmorillonitic, non-acid, thermic, Vertic Haplaquepts) using 44 or 67 kg soil-applied N ha⁻¹ along with foliar N as needed averaged 622 kg