1989

Annual Report of the Tennessee Agricultural Experiment Station, 1989

University of Tennessee Agricultural Experiment Station

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1989
Annual Report of the
Tennessee Agricultural Experiment Station

The University of Tennessee
Knoxville
LETTER OF TRANSMITTAL

Knoxville, Tennessee
January 2, 1990

To His Excellency, Ned McWherter
Governor of Tennessee:

SIR: I have the honor transmitting herewith, on behalf of the Board of Trustees of The
University of Tennessee, a report of the work and expenditures of the Agricultural Experiment
Station for the year 1989.

This report is submitted in accordance with the law requiring that such a report be submitted
annually by the administrators of the Experiment Station to the Governor of the State.

Respectfully submitted,
Lamar Alexander, President

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One Hundred and Second Annual Report
of the
Tennessee Agricultural Experiment Station
1989

FOREWORD

Included in this report are listings by departments of the following information:
1) Research projects active as of December 31, 1989;
2) Research projects terminated during the calendar year, 1989.
3) Bulletins, articles, and reports prepared by Experiment Station staff members and published
during the calendar year, 1989.

In addition, the report contains the financial statement for the Agricultural Experiment Station
covering the period July 1, 1988 to June 30, 1989. Also included is a list of the Experiment Station
personnel for the calendar year 1989.

Active Projects

As of December 31, 1989, there were 158 Hatch (TN) projects and five state (S) projects. Hatch
projects are supported in part with Federal-Grant funds made available by Congress to the
Agricultural Experiment Stations of the country under the Hatch Act Amended. State projects are
supported entirely by University funds. There were six McIntire-Stennis (forestry) projects. One
project was funded by a USDA Grant.

The headquarters of the Tennessee Agricultural Experiment Station is located on the
agricultural campus of The University of Tennessee at Knoxville. In addition, there are other
research centers which represent soil and climate conditions in the major regions of Tennessee.
These other research centers are listed in this report, and their locations are shown on the map on
page 4.

Projects Terminated

During 1989, 26 projects were terminated. Reports on these projects have either been published
or are being prepared for publications.

Publications

Published reports on research of The University of Tennessee Agricultural Experiment Station
appear in the Station Bulletins, in Research Reports, in Tennessee Farm and Home Science, in
professional, technical periodicals and various popular publications. Five Station Bulletins and 27
Research Reports were published during the year. These publications and other technical,
semi-technical, and special reports prepared and published during 1989 are listed in this annual
report.
FINANCIAL STATEMENT
July 1, 1988—June 30, 1989
The University of Tennessee Agricultural Experiment Station

<table>
<thead>
<tr>
<th>Hatch</th>
<th>Reg. Resource</th>
<th>McIntire Stennis</th>
<th>Animal Health and Disease</th>
<th>Grants and Contracts</th>
<th>State and Other</th>
<th>Total</th>
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<td>Professional Salaries</td>
<td>$2,649,118</td>
<td>639,958</td>
<td>270,583</td>
<td>5,843</td>
<td>5,093,781</td>
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<td>Biweekly Wages</td>
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<td>(2,000)</td>
<td>12,697</td>
<td>886,288</td>
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<td>Operating &amp; Misc.</td>
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<td>6,002</td>
<td>31,488</td>
<td>7,338,711</td>
<td>8,082,604</td>
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<td>Equipment &amp; Capital Outlay</td>
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<td>0</td>
<td>33,817</td>
<td>11,666</td>
<td>1,827,914</td>
<td>2,219,102</td>
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<td><strong>Total</strong></td>
<td><strong>$3,201,186</strong></td>
<td><strong>668,888</strong></td>
<td><strong>379,978</strong></td>
<td><strong>87,544</strong></td>
<td><strong>17,955,712</strong></td>
<td><strong>24,018,711</strong></td>
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</table>

Agricultural Experiment Station
Research Centers

1. Ames Plantation
   Fayette and Hardeman Counties, Grand Junction

2. Dairy Experiment Station
   Marshall County, Lewisburg

3. Forestry Experiment Station
   Anderson County, Oak Ridge

4. Highland Rim Experiment Station
   Robertson County, Springfield

5. Knoxville Experiment Station
   Knox County, Knoxville

6. Martin Experiment Station
   Weakley County, Martin

7. Middle Tennessee Experiment Station
   Maury County, Spring Hill

8. Milan Experiment Station
   Gibson County, Milan

9. Plateau Experiment Station
   Cumberland County, Crossville

10. Tobacco Experiment Station
    Greene County, Greeneville

11. West Tennessee Experiment Station
    Madison County, Jackson
AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

Project No. | Research Project Titles
---|---
TN 769 | Tennessee Agriculture's Response to Alternative Socioeconomic Environments
TN 783 | Economics of the Production of Tobacco and Alternative Enterprises in Tennessee
TN 790 | Demographic Trends of the Tennessee Rural and Farm Population
TN 796 | Economic Problems of Beginning Farmers
TN 839 (S-209) | Analysis of Structural and Organizational Change in Rural Counties in the South
TN 841 | The Economic and Environmental Consequences of Alternative Farming Systems
TN 850 (S-216) | Changing Patterns of Food Demand and Consumption Behavior
TN 866 | Economics of Winegrape Production and the Wine Industry in Tennessee
TN 870 (S-217) | Economic and Technical Forces Shaping the Southern Dairy Industry
TN 871 (S-103) | Technical and Economic Efficiencies of Producing and Marketing Landscape Plants
TN 873 (S-222) | Competition and Change in the Fruit and Vegetable Production and Marketing Systems
TN 876 | Economic Analysis of Livestock/Forage Systems
TN 882 | Impact Assessment of Soil Erosion Control Policies
TN 885 | Profitability and Process of Farm Decisions
TN 892 | Consumer Demand for Locally Grown Fresh Produce in Tennessee
TN 893 (S-224) | International Trade Research Commodities Important to the Southern Region
TN 896 | Analysis of International and Domestic Tobacco Markets
TN 904 | Fiscal Stress and Changes in Taxes and Services of Tennessee Local Governments
TN 912 (S-227) | Economic Analysis of Southern Regional Adjustments to a Dynamic Livestock-Meat Sector
TN 913 (S-231) | Analysis of the Structure, Efficiency and Competitiveness of the Southern U.S. Grain Marketing System
TN 918 (S-232) | Quantifying Long-Run Agricultural Risks and Evaluating Farmer Responses to Risk
TN 919 (W-178) | Water Management and Conservation in Western Irrigated Agriculture
TN 925 | Economics of Waste Management in Rural Areas

Projects Concluded in 1989

TN 713 | Economic Evaluation of Technological and Institutional Changes on Farmers in Tennessee
TN 736 (S-194) | Barriers and Incentives to Affordable Housing
TN 751 | Retail Demand for Tennessee Fresh Fruits and Vegetables
TN 825 | Economic Analysis of Machinery Inputs on Tennessee Farms
TN 826 | Potential for Limiting Liability Associated with the Use of Agricultural Chemicals
Bulletins and Reports


Isaacs, Steve, Darrell Mundy, and Donald Fowlkes. 1988 Farm Revenues Lost Due To Burley Tobacco Quota Underutilization in Tennessee Counties, Staff Paper SP-89-03.


Pompelli, Gregory K., and Morgan D. Gray. Profile of Undergraduate Students in Agricultural Economics and Rural Sociology: Demographics and Attitudes, Special Report 89-01.


Tennessee Farm and Home Science

Downing, M.E., and Roland K. Roberts. “Visitor-Use Value of the University of Tennessee Arboretum,” Tennessee Farm and Home Science, No. 152, Fall.


Journal Articles


M. S. Theses


Coady, Sean A. “Derived Demand for Tobacco by Type and Origin,” under Gregory K. Pompelli, May.
Willhite, Mack A.  “Application of Municipal Sewage Sludge to Agricultural Land in Tennessee,” under William M. Park, May.


Ph.D. Dissertations


Bulletins/Publications


Papers Presented and/or Proposed


Brooker, J. R. “Food Product Differentiation: The Use of Logos to Identify Origin,” 16th Annual Meeting, Midsouth Academy of Econ. & Finance, February.


Brooker, J. R. “Future Direction of Marketing Research,” Symposia Session on Ornamental Horticulture, AAEA Annual Conference, Baton Rouge, LA, August.


Huffaker, R. G. A Bioeconomic Livestock/Wild Horse Tradeoff Mechanism for Conserving Public Rangeland Vegetation selected paper for WAEA.


Isaacs, S. G. "The Economic Importance of Tobacco Production to Greeneville and Greene County," Exchange Club of Greeneville.


Orr, Robert H. "Funding Sources for Internationalizing Curricula," Presented to Meeting of Southern International Agriculture Directors' Association, Atlanta, GA.


Pompelli, G. K. "Growing Concerns in the Tennessee Winegrape Industry," Annual Meeting of Tennessee Viticulture and Oenology Society, Gatlinburg, TN.


Reports/Proceedings


### AGRICULTURAL ENGINEERING

<table>
<thead>
<tr>
<th>Project No.</th>
<th>Research Project Title</th>
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<tbody>
<tr>
<td>TN 765 (S-202)</td>
<td>Utilization of Animal Waste as Energy and Nutrient Sources in Warm Humid Climates</td>
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<tr>
<td>TN 786</td>
<td>Drying Grain Sorghum and Minor Crops in Tennessee</td>
</tr>
<tr>
<td>TN 816</td>
<td>Application of Artificial Intelligence to Agricultural Research and Production</td>
</tr>
<tr>
<td>TN 827</td>
<td>Undertree (non-ice encapsulation) Frost Protection</td>
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<tr>
<td>TN 838 (S-210)</td>
<td>Automatic Control of Field Machinery Functions</td>
</tr>
<tr>
<td>TN 872 (S-218)</td>
<td>Control, Prediction, Economics, and Environmental Effects of Soil Erosion</td>
</tr>
<tr>
<td>TN 878</td>
<td>Maintenance of Soybean Quality After Field Maturity</td>
</tr>
<tr>
<td>TN 887</td>
<td>On-Site Sewage Treatment</td>
</tr>
<tr>
<td>TN 888</td>
<td>Evapotranspiration Measurement and Estimation in Tennessee</td>
</tr>
<tr>
<td>TN 900</td>
<td>Improvement in the Harvest-to-Market Systems for Air-cured Tobacco</td>
</tr>
<tr>
<td>TN 902</td>
<td>Methods for Improving Earth-tube Systems for Energy Exchange Processes</td>
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<tr>
<td>TN 937</td>
<td>Mechanized Production of Selected Vegetable Crops for Commercial and Small Farms of Tennessee</td>
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<tr>
<td>TN 948 (S-235)</td>
<td>Integrated Systems and Controls for Processing and Storing Agricultural Commodities</td>
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### Projects Concluded in 1989

<table>
<thead>
<tr>
<th>Project No.</th>
<th>Research Project Title</th>
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<tr>
<td>TN 753 (S-195)</td>
<td>Engineering and Management Systems for Cotton Production, Harvesting, and Processing</td>
</tr>
<tr>
<td>TN 755</td>
<td>Processing and Storage of Southern Agricultural Commodities</td>
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<tr>
<td>TN 759</td>
<td>Mechanized Production of Selected Vegetable Crops in Tennessee</td>
</tr>
<tr>
<td>TN 766 (S-197)</td>
<td>Optimize Production Efficiency of Animal Housing Systems in the Southern Region</td>
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ANIMAL SCIENCE

<table>
<thead>
<tr>
<th>Project No.</th>
<th>Research Project Titles</th>
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<tbody>
<tr>
<td>8502444 (USDA Grant)</td>
<td>Bovine Fetal-Maternal Interactions</td>
</tr>
<tr>
<td>TN 529</td>
<td>Flexibility in Beef Production from Forage in Tennessee</td>
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<tr>
<td>TN 627</td>
<td>Genetic Variation in Nutrient Intake and Utilization of Grazing Beef Females as Related to Genotype x Environment Interaction</td>
</tr>
<tr>
<td>TN 774</td>
<td>Genetic and Economic Aspects of Foot Care and Soundness in Dairy Cattle</td>
</tr>
<tr>
<td>TN 809</td>
<td>Social and Environmental Influence on Reproductive Performance in Swine</td>
</tr>
<tr>
<td>TN 811</td>
<td>Postweaning Nutritional Management of Pigs During the Nursery Phase</td>
</tr>
<tr>
<td>TN 818</td>
<td>Preshipment Management and Transportation Effects on Subsequent Feeder Pig Performance</td>
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<tr>
<td>TN 819</td>
<td>Alternate Systems of Female Rearing and Reproductive Management in Swine</td>
</tr>
<tr>
<td>TN 820 (S-49)</td>
<td>Genetic Methods of Improving Dairy Cattle for the South</td>
</tr>
<tr>
<td>TN 844</td>
<td>Effect of Manipulation of Fermentation Dynamics on Silage Production and Animal Performance</td>
</tr>
<tr>
<td>TN 845 (NE-112)</td>
<td>Resistance to Mastitis in Dairy Cattle</td>
</tr>
<tr>
<td>TN 848</td>
<td>Comparison of Feed Delivery Systems for Lactating Dairy Cows</td>
</tr>
<tr>
<td>TN 859</td>
<td>Prepartum Nutrition and Postpartum Health and Performance of Dairy Cows</td>
</tr>
<tr>
<td>TN 874</td>
<td>Production Response of Byproducts and Whole Oilseeds in Dairy Rations</td>
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</table>
Changes in Alternate Energy Fuel Metabolism in Progressive Pregnancy and Subsequent Lactation in Ruminants and Their Regulatory Mechanisms

Indicators of Reproductive Capacity in the Beef Heifer

Alleviation of Fescue Toxicosis Using Prophylactic Drugs or Chemical Treatment

Effect of Dietary Energy on Energy Status of Dairy Cattle in Early Lactation

Nutrition and Management of Swine for Increased Reproductive Efficiency

Fetal-maternal Interactions in the Pig

Genetic Relationships to Growth and Reproduction in Diverse Poultry Populations

Cellular Defense Mechanisms of the Bovine Mammary Gland

Productivity of Livestock and Forage on Endophyte Infected and Non-infected Fescue Pastures

Physiological and Nutritional Manipulations to Enhance Growth and Survival in Heat Distressed Broilers

Treatment of Retained Placenta with Proteolytic enzymes

Dairy Herd Management Strategies for Improved Decision Making and Profitability

Use of Real-Time Ultrasound as a Predictor of Body Composition in Swine

Winter Annual Forages for Use in Dairy Rations

Fetal-Maternal Interactions in the Cow and Sheep

Projects Concluded in 1989

The Maintenance of Pregnancy in the Cow: Fetal Maternal Interactions

Selection of Beef Cattle for Optimum Use of Resources

Nutritional, Health & Behavioral Management of Purchased Feeder Pigs

Ontogeny of Corticosteroid Binding Globulin in Swine

Effects of Dietary Protein, Dietary Mineral Acid-Base Balance, and Photoperiod on Broiler Chickens

Bulletins, Articles, and Reports


COMMUNICATIONS

Articles

ENTOMOLOGY AND PLANT PATHOLOGY

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<tr>
<th>Project No.</th>
<th>Research Project Titles</th>
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<tr>
<td>TN 726 (S-186)</td>
<td>Management of Soil Microorganisms Affecting the Health and Vigor of Plants</td>
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<tr>
<td>TN 730 (S-192)</td>
<td>Biological Control of Selected Arthropod Pests and Weeds Through Introduction of Natural Enemies</td>
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<tr>
<td>TN 742</td>
<td>Detection, Identification and Occurrence of Plant Viruses in Tennessee</td>
</tr>
<tr>
<td>TN 812</td>
<td>Etiology, Ecology and Control of Soybean Diseases</td>
</tr>
<tr>
<td>TN 815</td>
<td>Etiology and Control of Fungus Pathogens of Beans</td>
</tr>
<tr>
<td>TN 829</td>
<td>Management and Bionomics of Cotton Insects</td>
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<tr>
<td>TN 830</td>
<td>Management Strategies for Control of Vegetable Diseases in Tennessee</td>
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<tr>
<td>TN 836</td>
<td>Population Dynamics of Heliothis Species on Wild and Cultivated Plants in Tennessee</td>
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<tr>
<td>TN 842 (S-212)</td>
<td>Biology of Genetically Changing Root-Knot and Cyst Nematodes of Soybeans</td>
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<tr>
<td>TN 856</td>
<td>Effects of Endophyte Infection on Resistance of Tall Fescue</td>
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<tr>
<td>TN 857</td>
<td>Aspects of the Population Ecology of Face Flies that Influence the Spread of Moraxella Bovis</td>
</tr>
<tr>
<td>TN 867</td>
<td>Biological Control Strategies for Management of Plant Diseases in Woody Ornamental Nurseries</td>
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<tr>
<td>TN 869 (S-219)</td>
<td>Arthropod Induced Stress on Soybean: Evaluation and Management</td>
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<td>TN 877</td>
<td>Bionomics and Management of Insect Pests of Wheat</td>
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<td>TN 889</td>
<td>Ecology of Insect Pests of Alfalfa and Season-Long Assessment of Insecticide Use</td>
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<td>TN 899</td>
<td>Effects of Endophyte Infection of Tall Fescue on its Resistance of Soil-Borne Insects</td>
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<td>TN 903</td>
<td>Biology and Ecology of Diptera on Cattle and Horses</td>
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TN 907 IR-4  A National Agricultural Program to Clear Pest Control Agents and Animal Drugs for Minor Uses
TN 916  Systematics, Ecology and Pathogenic Potential of Selected Plant-Parasitic Nematodes in Tennessee
TN 938  Management of Virus Diseases in Solanaceous Crops
TN 939  Host Plant Resistance to Burley Tobacco Insects
TN 940  Incidence, Severity, and Control of Cotton and Wheat Diseases Under Conventional and Reduced Tillage
S-96  Pesticide Data Collection and Reporting in Tennessee

Projects Concluded in 1989

TN 749  Biology and Control of Fungus Diseases Causing Economic Losses in Cotton, Wheat and Grain Sorghum
TN 752  Etiology and Epidemiology of Diaporthe SP. Phomopsis SP. Causing Soybean Stem Canker
TN 795  Etiology and Epidemiology of Dogwood Canker
TN 799  Host Plant Resistance and Chemical Control for Burley Tobacco Insects
TN 801  Biosystematics of Pitscales in Tennessee

Bulletins, Articles and Reports


1989 Annual Report


Young, L. D. 1989. Control of Soybean Cyst Nematode. West Tennessee Experiment Station Field Day.


FOOD TECHNOLOGY AND SCIENCE

Project No. | Research Project Titles
--- | ---
TN 807 | Effect of Processing Technologies on Acceptance and Shelf Life of Manufactured Meat Products
TN 831 | Sensory Evaluation of Foods: Methodological Studies
TN 832 | Enzymes in Dairy Products: Characteristics, Effects and Control
TN 834 | Determination of Calcium in Dairy Products and the Concentration as Influenced by Processing
TN 835 | Evaluation of the Quality and Nutritional Value of Fresh and Processed Fruit
TN 843 | Engineering Studies on Dehydrocooling of Vegetables
TN 847(S-214) | Product Development for Increased Utilization of the Sweet Potato
TN 854 | Cereal Food Products: Effects of Variations in Formulation and Processing on Quality
TN 861 | Microbiological Quality and Safety of Processed Foods
TN 864 | Production and Processing Systems to Produce Lean Beef for the Modern Consumer
TN 865 | Development of Baked, Breaded Vegetable Products with Defined Nutrient Levels and Fried Character
TN 894 | Evaluation of Food Crops Grown in Tennessee
TN 895 | Iodine Concentration in Milk
TN 926 | Spectrum and Mechanisms of Antimicrobials in Foods
TN 945 | Control of Toxigenic Fungi and Degradation of Mycotoxins
TN 950 | Stability of Oil/Fats During Frying and Their Contribution to Flavor and Sensory Characteristics of the Fried Food
TN 951 | Effect of Elevated Dietary Levels of Mono and Polyunsaturated Lipids on the Composition, Shelf-Life and Sensory Characteristics of Pork
S-89 | Methods for Dairy Products: Efficiency and Relationship to Product Quality
S-95 | Pesticide Residues and Their Degradation Products in Raw and Processed Foods

Projects Concluded in 1989

TN 758 | Food Lipids: Analysis and Effects on Quality
TN 760 | Effect of Animal Composition and Processing Methods on Meat Quality
TN 768 | Analysis, Assay and Control of Mycotoxins in Agricultural Products

Journal Articles


Research Reports

Books Published

FORESTRY, WILDLIFE AND FISHERIES

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<tr>
<td>TN 776</td>
<td>The Relationship Between Stress and Reduced Fitness in Food Fish</td>
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<td>TN 862</td>
<td>Biological Improvement of Chestnut (Castanea sp.)</td>
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<tr>
<td>TN 868</td>
<td>Culture and Management of Economically Important Fish Species in Tennessee Waters</td>
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<tr>
<td>MS-41</td>
<td>Genetic Improvement of Selected Hardwood and Coniferous Trees</td>
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<td>MS-44</td>
<td>Cytogenetic Studies of Hardwood and Coniferous Forest Trees</td>
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<td>MS-45</td>
<td>Genetic and Cultural Manipulations of Christmas Tree Species in Tennessee</td>
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<td>MS-46</td>
<td>Stand Regeneration Using Containerized Seedlings</td>
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<tr>
<td>MS-47</td>
<td>Growth and Yield Predictors for Oak-contaminated Forests in Tennessee</td>
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<tr>
<td>MS-48</td>
<td>Gamma Radiation and X-ray Techniques for Improved Manufacture and Performance of Wood-based Composites</td>
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<td>S-30</td>
<td>The University of Tennessee Arboretum</td>
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Bullets


Book Chapters Published


Research Reports


Fact sheets/Extension publications


Industry groups with/out handouts


M. S. Theses


Dissertations


Papers presented with abstracts


Popular Press Article


Refereed Articles in Proceedings


Refereed Journal Articles


Regional or Interregional Bulletins


Tennessee Farm and Home Science


Written Reports to Granting Agency


HUMAN ECOLOGY

Project No.  Research Project Title
TN 745  Carnitine Nutriture in Chronic Alcoholism
TN 750  Changing Dietary Behavior Via Nutrition Education
TN 840 (S-208)  Textile Fiber Systems for Performance, Protection and Comfort
TN 855  Effect of Dietary Sulfur Upon Fatty Acid Metabolism
TN 858  Soluble/Insoluble Dietary Fiber Levels as Effected by Processing Methods and Wheat Cultivars
TN 860  Factors Influencing the Nutritional Health of Adolescents During and Post Pregnancy
TN 914  Heating High-Fat Foods in Nonwoven, Melt Blown, Microwavable Material
TN 917  Short-Chain Triglyceride Use in Nutrition Formulas
TN 924  Effect of Storage on the Reversibility of the Hard-Cook Defect in Dried Beans
TN 934  Longitudinal Relationships Between Nutrient Intake and Bone Loss in East TN Caucasian Women

Projects Concluded in 1989
TN 770  Development of Economic Alternatives for the U.S. Textile Complex
TN 880  Effect of Calorie Restriction and Exercise on Age-Associated Physiological/Biochemical Changes of Rats

Bulletins, Articles, and Reports


**ORNAMENTAL HORTICULTURE AND LANDSCAPE DESIGN**

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<tr>
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<th>Research Project Titles</th>
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<tr>
<td>TN 771</td>
<td>Cultivars, Cultural and Mechanical Practices Evaluations in Turfgrass</td>
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<tr>
<td>TN 772</td>
<td>Evaluations of Pesticides for Pest Control and Phytotoxicity in Turfgrass</td>
</tr>
<tr>
<td>TN 833</td>
<td>Postpropagation Management of Tissue Cultured Liners</td>
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<tr>
<td>TN 863</td>
<td>Development of Tissue Culture Propagation Systems for the Asteraceae</td>
</tr>
<tr>
<td>TN 879</td>
<td>Analysis of Non-Nodulation mutants of Soybean</td>
</tr>
<tr>
<td>TN 883</td>
<td>Osmotic Adjustment and Turgor Regulation in Plant Roots</td>
</tr>
<tr>
<td>TN 891</td>
<td>Histology of Anthracnose Infections and Breeding Disease Resistance in Flowering Dogwood, Chinese Dogwood and Hybrids</td>
</tr>
<tr>
<td>TN 897</td>
<td>Chemical and Nutritional Control and Vertical Evaluations of Florists’ Bedding Plants</td>
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<tr>
<td>TN 898</td>
<td>Chemical and Nutritional Control of Plant Growth in Florists’ Crops</td>
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<tr>
<td>TN 911</td>
<td>Establishment and Maintenance of Ornamental Plants</td>
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<tr>
<td>TN 927</td>
<td>Evaluation and Adaptation of Landscape Plants for Nursery Production and Landscape Use in Tennessee</td>
</tr>
<tr>
<td>TN 941</td>
<td>Root Development and Physiology in Nursery Production Systems</td>
</tr>
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<td>TN 943</td>
<td>Woody Ornamental Plant Tissue Culture</td>
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<tr>
<td>TN 946</td>
<td>Mycorrhizal Fungi and Root Water Relations</td>
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Bulletins, Articles, and Reports


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**PATHOBIOLOGY**

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<th>Research Project Titles</th>
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<td>TN 920</td>
<td>Patterns of Transmission and Economic Impact of Internal Parasites in Beef Cow-calf Herds in Tennessee.</td>
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<tr>
<td>S 98</td>
<td>In vitro Investigation of Bovine Respiratory Syncytial virus Pathogenesis.</td>
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**Bulletins, Articles and Reports**

Breider, M.A., S. Kumar, and R.E. Corstvet. Interaction of bovine neutrophils in Pasteurella haemolytica mediated damage to pulmonary endothelial cells. Veterinary Immunology and Pathology (in press).


**PLANT AND SOIL SCIENCE**

<table>
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<th>Project No.</th>
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<tr>
<td>TN 757(S-201)</td>
<td>Role of Legume Cover Crops in Conservation Tillage Production Systems</td>
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<td>TN 792</td>
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Projects Concluded in 1989

TN 793 Alteration of Soil Chemical Properties Due to Continuous No-till practices
TN 794 Soil pH and Its Effects on Crop Growth and Nutrient Availability
TN 810 Vegetable Crop Production
TN 813 Dark Tobacco Breeding and Cultural Practices
TN 817 Mineralogy of Selected Soils in the Southern Region
TN 823 Germplasm Development in Forage Grasses
TN 824 Field Crop Responses to Plant Nutrient Applications on Soils
TN 849(S-215) Behavior and Fate of Selected Sulfonyl Urea and Imidazolinone Herbicides in the Southern Environment
TN 851 Soybean Breeding
TN 852(NC-140) Rootstock and Interstem Effects on Pome and Stone Fruit Trees
TN 901 Burley Tobacco Genetics, Breeding and Cultural Practices
TN 906(S-9) Plant Germplasm Introduction, Increase, Evaluation, Documentation, Maintenance and Distribution
TN 908(S-228) Variability of Soil Properties and Its Effect on Water Quality and Soil Management
TN 909 Quantifying Soil Movement and The Subsequent Affects on Soil Properties and Plant Growth
TN 910 Factors Affecting Weed Management in Field and Horticultural Crops

Projects Concluded in 1989

TN 566 Evaluation and Breeding of Forage Legumes
TN 705 Life History, Population Dynamics, and Inference: A Basis for Understanding Weed Biology

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