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HEALTH ASSESSMENT OF HERBICIDES:
A CASE STUDY OF THE PHENOXY HERBICIDES

Alvin L. Young *
Department of Medicine and Surgery
Veterans Administration
Washington, D.C. 20420

Abstract of Presentation

Weed Science Society of America
Hyatt Regency Miami
Miami, Florida
February 8, 1984

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Washington, D.C. 20506

Health Assessments of Herbicides: A Case Study of the Phenoxy Herbicides. A. L. Young, Department of Medicine and Surgery, Veterans Administration, Washington, D.C.

Few environmental or occupational health issues have received the sustained international attention that has been focused on the phenoxy herbicides and their associated chlorinated dibenzo-p-dioxin contaminants. Although much of the present concern centers around veterans of the Vietnam Conflict who believe they were exposed to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), a contaminant of the military defoliant "Agent Orange", the potentially larger issue is whether human health has been significantly impacted because of the widespread use of dioxin-contaminated herbicides to enhance agricultural production.

During the 5-year period from 1965 to 1970, the United States Air Force applied more than 40 million liters of Agent Orange in South Vietnam. Some two million American military personnel served 1-year tours during the same period. Recently, many veterans of that era have reported medical problems that possibly stem from exposure to Agent Orange during their military assignments. Their complaints have ranged from tingling in the extremities to rare forms of cancer. Some veterans have fathered children with birth defects and have suggested that Agent Orange is the culprit. Similar health issues have been raised by citizen groups in areas where the phenoxy herbicides are commercially used. To conduct epidemiologic studies of human populations exposed to the phenoxy herbicides and the dioxin contaminant, it is necessary to first know what health outcomes should be selected for study. Secondly, one must be able to identify a study cohort with a high likelihood of exposure and a control group with a low or no probability of exposure. Lastly, a sufficient number of individuals in each cohort must be located, recruited and examined in order to give statistical

validity to the results. These three requirements, so important for the conduct of valid studies, are in themselves not clearly defined with respect to either the chemicals used or the populations at risk. Health studies of the effects of phenoxy herbicides and/or the dioxin contaminant are very difficult under conditions of normal agricultural use, but become immensely more complex when conducted with cohorts briefly exposed over a decade ago during the conditions of war in a tropical environment.

The basis for resolving the phenoxy herbicide controversy must in large measure stem from the results of scientific inquiry. Accordingly, the Veterans Administration (VA) in cooperation with other Federal Agencies in the United States Government has initiated extensive health studies of veterans exposed to Agent Orange during the Vietnam Conflict. In addition, numerous studies of non-veteran populations exposed to the phenoxy herbicides and TCDD have been initiated. To date, more than 20 human health studies have been or are now being conducted by agencies of the Federal Government. The cost of these studies presently exceeds 80 million dollars. The results of many of these studies will be presented.

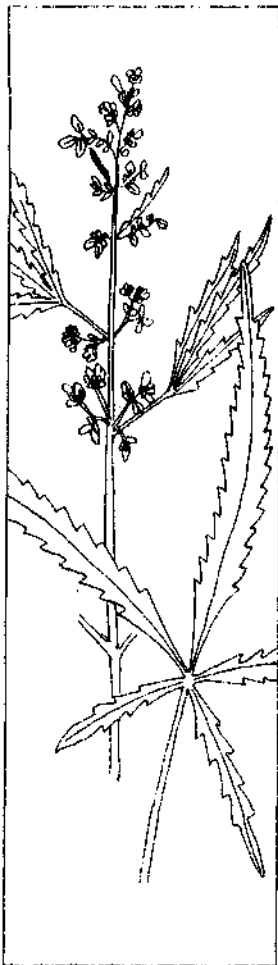
YOUNG

WEED SCIENCE SOCIETY OF AMERICA

TWENTY-FOURTH MEETING
1984 PROGRAM

Hyatt Regency Miami
Miami, Florida
February 8-10, 1984

Theme
WEED SCIENCE AND HIGH TECHNOLOGY



1983 — 1984

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WEED SCIENCE SOCIETY
OF AMERICA**

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24th Meeting

WEED SCIENCE SOCIETY OF AMERICA

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Sustaining Members.	Inside Back Cover

PLEASE BRING THIS PROGRAM WITH YOU
TO THE MEETING

WELCOME TO MIAMI

It is a privilege and an honor for me to welcome WSSA members, spouses, and guests to the 24th meeting of the Weed Science Society of America. Miami has always been one of the more favored meeting sites and our hotel for the 1984 meeting has some of the best facilities ever.

The Program Committee, chaired by John Nalewaja, and the Local Arrangements Committee, headed by David Teem, have worked hard to develop an excellent program and in providing good facilities for the meeting. This group has also done an excellent job in providing our members and guests optional activities before and after the meeting.

Several outstanding speakers will add to the interest and excitement of our program and challenge us, along with our usual array of volunteer speakers, in discussing future advancements in weed science technology.

I join President Elect Nalewaja, the Program Committee, and the Local Arrangements Committee in welcoming you to Miami. We hope that you have a highly successful meeting, as we examine challenges for weed science technology in future years.

—C. G. McWhorter, President, WSSA

THE 1984 PROGRAM

The Program Committee has prepared an excellent program, and the Local Arrangements Committee has been diligently arranging for what should be a pleasant well-organized meeting. You are invited to attend the WSSA Annual Meeting in the new Hyatt Regency in Miami.

The theme of the meeting is "Weed Science and High Technology". The General Session will contain the Presidential Address by C. G. McWhorter, presentations by experts on Recombinant DNA and Cell Culture and Results of Exposure to Herbicides and Human Health.

Special symposia will involve Microbiological Weed Control, Herbicides and Water Contamination, New Methods for Educational Weed Science Programs, and Methodology for Assessment of Herbicides in Soil. These symposia will have presentations by leading scientists and will provide an opportunity to learn the latest information on the various topics.

The 1984 Program contains over 250 presentations, not including the symposiums, which provide information on the results of the latest research relating to all aspects of Weed Science. The New Developments from Industry section will again be combined with the Poster section. Authors for these papers will be present for presentation and discussion of their data from 8:00 to 9:45 a.m. on Wednesday, and the posters will remain displayed until noon on Thursday. Everyone is invited to attend the joint meeting of the Regional Project on Biological Control of Weeds with Plant Pathogens (S-136) and the WSSA Biological Control of Weeds Committee on Tuesday, 8:00 a.m. to 5:00 p.m., and Wednesday 8:00 a.m. to 9:50 a.m.

REGISTRATION—We recommend that you preregister, both to save money and to save time at the registration desk. Preregistration materials were sent to WSSA members in November and anyone not receiving them should request material from Claude Cruse, WSSA Executive Secretary, 309 West Clark Street, Campaign, IL 61820.

Preregistrants will receive propacked registration material at the registration desk. The registration desk will be open on Tuesday, February 7, and will remain open for most of the meeting. Preregistration will be \$20 member and \$30 nonmember, and registration at the meeting will be \$30 member and \$40 nonmember.

WSSA AWARDS LUNCHEON—Please purchase tickets for this event through preregistration or at the registration desk.

ABSTRACTS—Bound abstracts of the papers presented will be provided with registration and extra copies can be purchased with preregistration, at the meeting, or from the WSSA Business Office. The number in parentheses after each title in the program refers to the number of the abstract.

PROGRAMS—Please bring your advance copy of the program with you. Extra copies will be available at the registration desk for a small charge. We look forward to seeing you in Miami.

—John D. Nalewaja, Program Chairman

SPOUSES PROGRAM SCHEDULE OF EVENTS

TUESDAY, February 7, 1984

Location: Orange A

2:00— Register at WSSA Registration Desk
8:00 PM

WEDNESDAY, February 8, 1984

Location: Orange A

8:00— Coffee and Pastries
9:30 AM Registration
Tour information, general Miami information
9:30— Unique Miami Tour
5:00 PM Villa Vizcaya: narrated tour of mansion and of the exquisite formal gardens, plus unique gift shop.
Luncheon: served at waterfront restaurant with choice of menu items; browse around Coconut Grove.
Fairchild Tropical Gardens: guided tram ride around 83 acre tropical botanical garden, plus visit to rare plant house.
Tour Cost: \$28.00 (includes luncheon)

THURSDAY, February 9, 1984

Location: Orange A

8:00— Coffee and Pastries
9:00 AM Program designed to include children
Tour information, general Miami information
9:00— Seaquarium: guided tour of oceanarium, mono-
11:45 AM rail ride, and three shows—Flipper of TV farm, Hugo the Killer Whale, and the Sea Lion Circus. Return to hotel in time for Awards Luncheon.
Morning Tour Cost: Children \$10.50
Adults \$14.00

2:30-- Shop or Skate: spouses and kids board buses
6:00 PM for West Dade County where children will be
accompanied by a youth counselor to Super
Skate Center (bring socks) and spouses will be
taken to the discount fashion district then on
to the Falls Shopping Plaza.
Afternoon Tour Cost: Children \$15.00 (includes
skate rental and game tokens), Adults \$10.00

FRIDAY, February 10, 1984

Location: Orange A and B

8:00-- Coffee and Pastries
9:00 AM General Miami information
9:00-- Fashion Colors and You: seminar on biggest
10:30 AM fashion topic of the year . . . Individual Color
Coding . . . a great guide to simplify make-up
and fashion decisions. The speaker will take
individual appointments for private color-
coding for the remainder of the day.
Seminar--No charge
Private Color Coding--\$40.00

LOCATION OF SPECIAL COMMITTEES AND ACTIVITIES

Executive Secretary Gardenia B & C
Local Arrangements Gardenia B & C
Public Relations Azalea A
Press Gardenia A
Placement Service Azalea B
Photo Contest Display Promenade
Photo Contest Judging
(Photographs must be delivered to Orchid A
by 5:00 PM Tuesday, February 27) Orchid A
Spouses' Program Orange Blossom A
S-136 Biological Control of Weeds UM S-1
WSSA Support Industry Displays Corridor Display

COMMITTEE MEETINGS

TUESDAY, February 7

	Room
8-10 AM	Local Arrangements, Miami . . . Orange Blossom C
7-10 AM	Associate Editors--Weed Science UM S-2
8-5 PM	Biological Control of Weeds and S-136 . . . UM S-1
8-10 AM	Constitution and Operating Procedures . Orchid B
8-10 AM	Extension Award UM S-5
8-10 AM	Finance Orchid D
8-10 AM	Membership Lantana
8-10 AM	Sustaining Membership Marigold
8-10 AM	Weed Alert Camellia
10-5 PM	Board of Directors UM S-4
10-Noon	Adjuvant Terminology Allamanda
10-Noon	Parent Awards Bougainvillea A

10-Noon	Resolutions Poinciana A
10-Noon	Weeds Today, Parent UM S-3
1-3 PM	Directory of Personnel Engaged in Weed Science Bougainvillea A
1-3 PM	Education Poinciana A
1-3 PM	Extension Camellia
1-3 PM	Fellows and Honorary Members Allamanda
1-3 PM	Herbicide Handbook Marigold
1-3 PM	Historical UM S-2
1-5 PM	International Affairs UM S-3
1-9 PM	Photo Contest Orchid A
1-3 PM	Weed Today Board of Directors Lantana
1-5 PM	Aquatics Plant Management Society Board Meeting Orange Blossom B
3-5 PM	Computer Application Orchid B
3-5 PM	Herbicides for Minor Uses Orchid D
3-5 PM	Local Arrangements, 1985 Bougainvillea B
3-5 PM	Losses Due to Weeds-- Weed Causing Losses Poinciana B
3-5 PM	Meeting Site Policy and Site Selection . . . UM S-5
2-5 PM	Reviews of Weed Science Orange Blossom C
3-5 PM	Terminology Hibiscus A
3-5 PM	Weed Science Editorial Hibiscus B
7-10 PM	USDA-ARS . . Tuttle Ballroom Center and South
8-10 PM	Advertising of WSSA Publications Orchid B
8-10 PM	Second Weed Science Journal Orchid D

WEDNESDAY, February 8

7-9 AM Weeds Today Editorial and
Board of Directors UM S-3
8-9:50 AM S-136 and Biological Control of Weeds . . . UM S-1
2-4 PM Mimograph Camellia
1:30-5 PM Business Meeting for S-136 Members UM S-1

THURSDAY, February 9

4-6 PM Finance Lantana

FRIDAY, February 10

7-Noon Board of Directors UM S-4

Additional committee meetings or changes in time or location
will be posted on the bulletin board near the registration desk.
Committee meetings are open to all who may wish to attend.

SUMMARY OF PROGRAM

TUESDAY, February 7

	Room/Area
Committee Meetings	Assigned Rooms
	7:00 AM to 10:00 PM
Registration (including spouses)	Promenade
	2:00 PM to 8:00 PM
Board of Directors	UM S-4
	10:00 AM to 5:00 PM
S-136 (Open Meeting)	UM S-1
	8:00 AM to 5:00 PM

WEDNESDAY AM, February 8

- Registration (including spouses) Promenade
7:30 AM to 5:00 PM
- S-136 (Open Meeting) UM S-1
8:00 AM to 9:50 and
S-136 members only 1:30 to 5:00 PM
- XII-XIV. New Developments from Industry
and Posters. UM S-4 and 5
8:00 AM to 9:45 AM (Posters accompanied
by authors from 8:00 to 9:45 AM on
Wednesday, but posters will be displayed
until noon Thursday)
- General Session Brickell, Flagler and Monroe Ballroom
10:00 AM to 12:00

WEDNESDAY PM, February 8

- I-A. Agronomic Crops Monroe
I-B. Agronomic Crops Tuttle
II. Horticulture Crops Hibiscus B
V-VI. Aquatic and Marginal Weeds and
Regulatory Aspects Symposium:
Impact of Ground and Surface
Water Contamination on
Pesticide Regulations. Hibiscus A
VII. Teaching and Extension Symposium:
New Approaches to Information Transfer. . Flagler
IX. Ecology and Biological Control Orchid C and D
X. Physiology Jasmine
XII-XIV. New Developments from Industry and
Posters on display. UM S-4 and 5

THURSDAY AM, February 9

- Registration, 8:00 to 12:00 Promenade
- I-A. Agronomic Crops Tuttle
I-B. Agronomic Crops Orchid C and D
II. Horticultural Crops. Orchid A and B
V. Aquatic and Marginal Weeds. Hibiscus B
IX. Ecology and Biological Control Hibiscus A
X. Physiology Jasmine
XI. Soil Aspects Symposium:
Assessment of Methodology
for Field Evaluation of Herbicide
Behavior in Soils University Auditorium
- XII-XIV. New Developments from Industry and
Posters on display. UM S-4 and 5
- WSSA Awards Luncheon. Brickell, Flagler,
11:30 AM to 1:30 PM and Monroe Ballroom

THURSDAY PM, February 9

- I. Agronomic Crops Tuttle
III. Turf and Ornamentals Hibiscus B
IV. Pasture, Rangeland, Forests,
Rights of Way, and
Industrial Sites Orchid C and D
VI. Regulatory Aspects. Orchid A and B
VIII. Equipment and Machinery. Flagler
3:30 to 5:00
IX. Ecology and Biological Control Hibiscus A

- X. Physiology Jasmine
XI. Soil Aspects Symposium
Continued, 2:00 to 3:15 University Auditorium

FRIDAY AM, February 10

- Board of Directors UM S-4
7:00 to 11:45 AM
- I. Agronomic Crops Tuttle
VII. Teaching and Extension Brickell
IX. Ecology and Biological Control
Symposium: Microbiological Control
of Weeds Flagler
X. Physiology Jasmine
XI. Soil Aspects Monroe
XIII. International Weed Science Hibiscus A

COMPLETE PROGRAM**WEDNESDAY AM, FEBRUARY 8**

**SECTION XII
POSTER SESSION
NEW DEVELOPMENTS FROM INDUSTRY**

Posters will be arranged by number in the room and
will remain on display (unaccompanied) until
12:00 Noon on Thursday, February 9.

Section XII will meet as a group at 7:45 AM preceding
the session to select a Section Chairman-Elect and
to discuss any additional section business.

Location: UM S-4 and 5
Section Chairman: A. R. Bell, Uniroyal Chemical Division of
Uniroyal, Inc., Bethany, CT.
Authors Present: Wednesday 8-9:45 AM

DOWCO 453 ME, Performance and Registration Status. J. C.
Ryder* and R. D. Vatne, Dow Chemical USA, Midland, MI.

Weed Control with AC 222,293 in Cereals. N. Luke*, American
Cyanamid Co., Princeton, NJ and G. B. Kinoshita, Cyanamid
Canada, Inc., Willowdale, Ontario (258).

UC77179, A New Industrial Herbicide. J. E. Gallagher* and R.
A. Shaw, Union Carbide Agricultural Products Co., Inc., Re-
search Triangle Park, NC (259).

Summary of Lactofen Experimental Use Permit for Weed Con-
trol in Soybeans. F. R. Taylor* and J. Deli, PPG Industries,
Inc., Pittsburgh, PA (260).

*Denotes person presenting paper.

SD95481, A New Soil-Applied Herbicide for Use in Broad-leaved Crops. J. H. Long*, Shell Chemical Co., Houston, TX, J. W. May and J. R. Goss, Shell Development Co., Modesto, CA (261).

New Developments with Poast® Herbicide. W. McAvoy* and R. Evans, BASF Wyandotte Corporation, Parsippany, NJ.

WSSA SUPPORT INDUSTRY DISPLAYS

Location: Corridor Display, Level One

Stewart Agricultural Research Services Inc.
Ellsworth R. Stewart, Macon, MO

Virginia Chemicals Inc.
Logan C. Bostian, Portsmouth, VA

Cenex
Mike Harrell, St. Paul, MN

Micron West Corporation
Frank McGravey, Houston, TX

WEDNESDAY AM, FEBRUARY 8

SECTION XIV POSTER SESSION

Posters will be arranged by number in the room and will remain on display (unaccompanied) until 12:00 Noon on Thursday, February 9.

Section XIV will meet as a group at 7:45 AM preceding the session to select a Section Chairman-Elect and to discuss recommendations for improvement of the Section.

Location: UM S-4 and 5
Section Chairman: L. L. Whatley, Department of Plant Pathology and Weed Science, Mississippi State University, Mississippi State.
Authors Present: Wednesday 8-9:45 AM

Distribution of Weed Seeds Within Soil Structural Units as Affected by Tillage. M. R. Pareja*, D. W. Staniforth, and G. P. Pareja, Iowa State University, Ames (274).

Germination and Growth Inhibitory Sesquiterpenoids from *Iva axillaris* Pursh. R. B. Wolf* and G. F. Spencer, USDA-ARS, Northern Regional Research Center, Peoria, IL (275).

Water-stress Induced Germination of Giant Foxtail (*Setaria faberi* Herrm.) Seeds. R. B. Taylorson, USDA-ARS, Beltsville, MD (276).

Induction and Release of Secondary Seed Dormancy in Wild Oats (*Avena fatua*). H. R. Tiltsner* and M. K. Upadhyaya, The University of British Columbia, Vancouver (277).

Growth of Yellow (*Cyperus esculentus* L.) and Purple (*Cyperus rotundus* L.) Nutsedges Along a Moisture Gradient. R. D. Williams*, L. R. Ahuja, and R. R. Huckleberry, USDA-ARS, Durant, OK (278).

Effects of Mefluidide on the Chemical Composition of Wheat Forage and Grain Yield Components. T. H. Dao, USDA-ARS, El Reno, OK (279).

Influence of Isouron on Several Plant Growth Systems. R. M. Devlin*, S. J. Karczmarczyk, and I. I. Zbiec, University of Massachusetts, East Wareham (280).

Effects of Dicamba on Leafy Spurge (*Euphorbia esulu* L.) Cell Cultures. D. S. Galitz, North Dakota State University, Fargo (281).

Cellular Alterations from Foliar Applications of HOE-39866, SC-0224 and Glyphosate. R. R. Bellinder*, R. E. Lyons, S. E. Scheckler, Virginia Polytechnic Institute and State University, Blacksburg, and H. P. Wilson, Virginia Truck and Ornamentals Research Station, Painter (282).

Comparative Metabolism of Atrazine, CDA, and EPTC in Proso-Millet (*Panicum miliaceum* L.) and Corn. G. Erza* and G. R. Stephenson, University of Guelph, Ontario (283).

Interaction of Dowco 453 and Fluazifop-butyl with Auxin Responses. M. Barrett* and G. L. Olson, University of Kentucky, Lexington (284).

Metabolism and Translocation of Some Pyridinyloxyphenoxy Propionic Acid Herbicides in Rhizomatous Quackgrass [*Agropyron repens* (L.) Beauv.]. P. Hendley* and J. W. Dicks, ICI Plc, Jealott's Hill Research Station, England, and T. J. Monaco, North Carolina State University, Raleigh (285).

Uptake and Translocation of Fluazifop-butyl in Three Annual Grasses. J. F. Derr*, T. J. Monaco, and T. J. Sheets, North Carolina State University, Raleigh (286).

Analysis of Fluazifop Residues in Vegetable Crops Using High Performance Liquid Chromatography. N. L. Yates*, R. B. Leidy, T. J. Sheets, and T. J. Monaco, North Carolina State University, Raleigh (287).

Enzyme-linked Immunosorbent Assay for Residue Analysis of Atrazine. B. D. Dunbar* and M. R. Barrett, USDA-ARS, Akron, CO (288).

Chemical Control of Triazine Resistant Common Lambsquarters (*Chenopodium album* L.) and Pigweed (*Amaranthus* spp.) in corn. E. P. Furest*, M. Barrett, and D. Penner, Michigan State University, East Lansing (289).

Optimum Growth Stage and Rate Affecting the Activity of SC-0224 in Controlling Quackgrass [*Agropyron repens* (L.) Beauv.]. P. C. Bhowmik, University of Massachusetts, Amherst (290).

Ethephon Influence on Field Bindweed (*Convolvulus arvensis* L.) Control by Glyphosate and Dicamba. R. L. Anderson, USDA-ARS, Akron, CO (291).

Effect of Spray Volume and Surfactant Concentration on Glyphosate Efficacy. D. E. Bayer* and Gary L. Darmstadt, University of California, Davis (292).

Chemical Weed Control in Burley Tobacco in Virginia: A Ten-Year Summary. C. L. Foy* and H. L. Witt, Virginia Polytechnic Institute and State University, Blacksburg (293).

Herbicides and Their Use in Canadian Forests. R. Prasad, Forest

Pest Management Institute, Canadian Forestry Service, Sault Ste. Marie, Ontario (294).

The Clearance of Herbicides for Minor Uses. M. E. Burt*, G. M. Markle and R. H. Kupelian, Interregional Research Project No. 4 (IR-4 Project), New Jersey Agricultural Experiment Station, Rutgers University, New Brunswick (295).

A Rotary Herbicide Wiper for Orchard and Nursery Weed Control. W. V. Welker* and D. L. Peterson, USDA-ARS, Kearneysville, WV (296).

Repeated Applications of Residual Herbicides on Growth and Yield of Apple. E. J. Hogue* and A. Gaunce, Agriculture Canada, Summerland, British Columbia (297).

Interactions of Herbicides and Crop Culture Systems. M. M. Schreiber*, USDA-ARS, and M. D. White, Purdue University, West Lafayette, IN (298).

WEDNESDAY AM, FEBRUARY 8

GENERAL SESSION WEED SCIENCE AND HIGH TECHNOLOGY

Location: Brickell, Flagler, and Monroe Ballroom
Chairman: J. D. Nalewaja, President Elect, WSSA, Agronomy Department, North Dakota State University, Fargo.

- 10:00 Welcome. F. A. Wood, University of Florida, Dean for Research, Institute of Food and Agricultural Sciences, Gainesville.
- 10:10 Future Needs in Weed Science—Presidential Address. C. G. McWhorter, President, WSSA, USDA-ARS, Southern Weed Science Laboratory, Stoneville, MS.
- 10:30 Genetic Engineering Impact on Weed Science: Recombinant DNA. James R. Wild, Department of Biochemistry and Biophysics, College of Agriculture, Texas A&M University, College Station (299).
- 10:55 Genetic Engineering in Weed Science: Cell Culture. J. M. Widholm, Department of Agronomy, University of Illinois, Urbana (300).
- 11:20 Health Assessment of Herbicides: A Case Study of the Phenoxy Herbicides. Major Alvin L. Young, USAF, Veteran's Administration Central Office, Washington, DC (301).
- 11:45 Adjourn

WEDNESDAY PM, FEBRUARY 8

SECTION I—A AGRONOMIC CROPS

Location: Monroe Ballroom
Section Chairman: J. M. Chandler, Texas Agricultural Experiment Station, College Station.
Moderator: L. M. Wax, USDA-ARS, University of Illinois, Urbana.

- 1:00 Wild Oat (*Avena fatua* L.) Control in Wheat with AC-222,293. S. D. Miller* and J. D. Nalewaja, North Dakota State University, Fargo (1).
- 1:15 Chlorsulfuron and Related Compounds for the Control of Wild Garlic (*Allium vineale* L.) in Winter Wheat. E. J. Peters* and R. A. McKelvey, USDA-ARS, and Missouri Agricultural Experiment Station, Columbia (2).
- 1:30 Full-season Interference by Common Lambsquarters (*Chenopodium album* L.) in Spring Barley at Various Soil Fertility Levels. J. S. Conn*, USDA-ARS, and J. A. Delapp, University of Alaska, Fairbanks (3).
- 1:45 Wild Proso Millet (*Panicum miliaceum* L.) Control in Corn. J. A. Fawcett* and R. G. Harvey, University of Wisconsin, Madison (4).
- 2:00 Wild Proso Millet (*Panicum miliaceum* L.) Control in Corn. R. Behrens*, D. D. Warnes, and D. W. Kidder, University of Minnesota, St. Paul (5).
- 2:15 Control of Quackgrass [*Agropyron repens* (L.) Beauv.] with Glyphosate and SC-0224. P. T. Kivlin* and J. D. Doll, University of Wisconsin, Madison (6).
- 2:30 Recess
- 2:45 Control of Volunteer Corn in Soybeans. L. E. Paul* and E. L. Knake, University of Illinois, Urbana (7).
- 3:00 A Systematic Approach to Quackgrass [*Agropyron repens* (L.) Beauv.] Control in Soybeans. J. L. Wilhm* and W. F. Meggitt, Michigan State University, East Lansing (8).
- 3:15 Weed Control and Weed Flora in Soybeans after Three Years of State Seedbed Planting. C. D. Elmore* and L. G. Heatherly, USDA-ARS, Stoneville, MS (9).
- 3:30 Interference and Control of Giant Foxtail (*Setaria faberi* Herrm.) in Soybeans. S. K. Harrison* and C. S. Williams, University of Illinois, Urbana, and L. M. Wax, USDA-ARS, Urbana (10).
- 3:45 Evaluation of Chlorsulfuron for Russian Thistle (*Salsola kali* L. var. *rusthenica*) Control. F. L. Young* and D. R. Gealy, USDA-ARS, Pullman, WA (11).
- 4:00 Effects of Some Herbicides, Surfactants, and Their Interactions on Cogongrass. B. A. Al-Juboory* and A. A. Sarmaly, Baghdad, University of Bagdad, Iraq (12).
- 4:15 Discussion

WEDNESDAY PM, FEBRUARY 8

SECTION I—B
AGRONOMIC CROPS

Location: Tuttle Ballroom

Section Chairman: J. M. Chandler, Texas Agricultural Experiment Station, College Station.

Moderator: P. A. Banks, University of Georgia, Athens.

- 1:00 Antagonism Between Broadleaf and Grass Control Herbicides. A. G. Dexter*, J. D. Nalewaja, and S. D. Mitler, North Dakota State University, Fargo (13).
- 1:15 The Interaction of Bentazon and Haloxyfop-methyl or Sethoxydim. C. S. Williams*, University of Illinois, Urbana, and L. M. Wax, USDA-ARS, Urbana (14).
- 1:30 Potential Interaction of Acifluorfen and Bentazon Combinations when Used to Control Common Broadleaf Weed Species in Michigan Soybeans. V. M. Sorensen*, W. F. Meggitt, and D. Penner, Michigan State University, East Lansing (15).
- 1:45 The Effectiveness of Fluazifop-butyl Alone and in Tank Mixture with Bentazon or Acifluorfen. W. A. Dortenzio*, J. T. Daniel, S. A. Harrison, W. K. Majure, S. H. Newell, and R. P. Rose, ICI Americas Inc., Goldsboro, NC (16).
- 2:00 Synergistic Response of Tank-Mixing Fomesafen with Bentazon for Broadleaf Weed Control in Soybeans. W. H. Palmer*, R. P. Rose, J. J. Bates, C. V. Greeson, and W. A. Dortenzio, ICI Americas Inc., Goldsboro, NC (17).
- 2:15 Interaction Between Bentazon and Fluazifop for Annual Grass Control. J. L. Godley* and L. M. Kitchen, Louisiana Agricultural Experiment Station, Baton Rouge (18).
- 2:30 Recess
- 2:45 Chlorpyrifos-Metribuzin Interactions in Soybeans. P. A. Banks, University of Georgia, Athens (19).
- 3:00 Performance of SD 95481 in Herbicide Combinations for Broad Spectrum Weed Control in Soybeans. J. R. Goss* and J. W. May, Shell Development Company, Modesto, CA (20).
- 3:15 Cultural Practices and Chemical Weed Control in Cereals in the Dry Regions. S. T. Kukula* and A. Dakermanji, International Center for Agricultural Research in the Dry Areas, Aleppo, Syria (21).
- 3:30 Effects of Soil Temperature on Early Growth of Giant Foxtail (*Setaria faberi* Herrm.) and Velvetleaf (*Abutilon theophrasti* Medic.) in Soybeans. J. L. Michael*, R. S. Fawcett, and S. E. Taylor, Iowa State University, Ames (22).
- 3:45 Carbohydrate Production by Weeds. A. F. Wiese*, E. S. Nussbaum, and T. Vongkaysone, Texas Agricultural Experiment Station, Bushland (23).
- 4:00 Discussion
- 4:30 WSSA Business Meeting (Tuttle Ballroom)

WEDNESDAY PM, FEBRUARY 8

SECTION II
HORTICULTURE

Location: Hibiscus B

Moderator: S. Dennis, Stauffer Chemical Co., Dayton, NJ.

- 1:00 Evaluation of Postemergence Grass Herbicides in Citrus. Megh Singh*, D. P. H. Tucker, and Brian S. Combs, University of Florida, AREC, Lake Alfred (63).
- 1:15 Sod-Planted Versus Conventionally-Planted Peach Trees. W. V. Welker, Jr.*, USDA-ARS, Kearneysville, WV (64).
- 1:30 Interactions Between Groundcovers and Golden Delicious Apples. John Shribbs* and W. A. Skroch, North Carolina State University, Raleigh (65).
- 1:45 Responses of Fraser Fir, Norway Spruce, and Hemlock to Glyphosate: Effect of Rate and Time of Application. W. A. Skroch* and J. C. Neal, North Carolina State University, Raleigh (66).
- 2:00 Effect of Additives on Quackgrass Control with Glyphosate. J. A. Ivany*, Agriculture Canada, Research Station, Charlottetown, Prince Edward Island (67).
- 2:15 Responses of Five Ground Cover Species to OT Applications of Glyphosate: Effects of Rate and Time. J. C. Neal* and W. A. Skroch, North Carolina State University, Raleigh (68).
- 2:30 Recess
- 2:45 Influence of Weed Control Programs in Intensive Cropping Systems. N. C. Glaze*, C. C. Dowler, A. W. Johnson, USDA-ARS, and D. R. Sumner, University of Georgia, Tifton (69).
- 3:00 Factors Influencing Fluazifop-butyl Activity in Horticultural Cropping Systems. Reid J. Smeda* and A. R. Putnam, Michigan State University, East Lansing (70).
- 3:15 Another Culture Derived Plantlets of Atrazine Resistant Rutabaga Genotypes. V. Souza Machado*, J. Shupe, University of Guelph, and W. Keller, Agriculture Canada, Ontario (71).
- 3:30 Comparison of Pendimethalin and Tillage for Potato Weed Control. D. C. Nelson* and J. F. Giles, North Dakota State University, Fargo (72).
- 3:45 Weed Control by Chemigation with Metham. J. R. Teasdale*, P. B. Adams, and R. B. Taylorson, USDA-ARS, Beltsville, MD (73).
- 4:00 Influence of Herbicides on New Tuber Formation and Control of Yellow Nutsedge (*Cyperus esculentus* L.). W. Percira*, G. Crabtree, and R. D. William, Oregon State University, Corvallis (74).
- 4:15 Discussion
- 4:30 WSSA Business Meeting (Tuttle Ballroom)

WEDNESDAY PM, FEBRUARY 8

SECTION V--VI SYMPOSIUM

Impact of Ground and Surface Water Contamination on State and Federal Pesticide Use Regulations

Location: Hibiscus A

Organizer: J. E. Gallagher, Union Carbide Agricultural Products Co., Inc., Research Triangle Park, and R. E. Eplee, USDA-APHIS-PPQ, Whiteville, NC.

Moderator: R. E. Eplee, USDA-APHIS-PPQ, Whiteville, NC.

Symposium Summarizer and Discussion Leader: S. Fertig, USDA-ARS, Beltsville, MD.

- 1:00 Agriculture, Pesticides and the South Florida Environment. J. R. Orsenigo*, Florida Sugar Cane League, Clewiston, FL (119).
- 1:20 "The Temik Experience". R. C. Back*, Union Carbide Agricultural Products Co., Inc., Research Triangle Park, NC (120).
- 1:40 Assessment and Regulation of Pesticides in Runoff, Water Bodies, and Ground Water. R. W. Holst*, U.S. Environmental Protection Agency, Washington, DC (121).
- 2:00 Chemical Properties Which Regulate Herbicide Movement in Soils and Waters. J. B. Weber*, North Carolina State University, Raleigh (122).
- 2:20 Nonpoint Pollution of Surface Waters by Chemicals: Kinetic Aspects of Desorption of Pollutants by Runoff Waters. R. D. Wachope* and A. N. Sharpley, USDA-ARS, Southern Weed Science Laboratory, Stoneville, MS, and USDA Water Quality and Small Watershed Research Laboratory, Durant, OK (123).
- 2:40 Recess
- 2:50 Need for Feedback from Fate and Effects Studies of Herbicides into Integrated Aquatic Weed Management. K. Reinert*, M. L. Hinman, J. Rogers, Jr., and K. L. Dickson, Institute of Applied Sciences, North Texas State University, Denton (124).
- 3:10 Planning Aquatic Plant Management Programs. J. T. McGehee* and J. C. Joyce, US Army Corp of Engineers, Jacksonville, and the Center for Aquatic Weeds, University of Florida, Gainesville (125).
- 3:30 The Role of the State Agricultural Experiment Stations, Now and in the Future, in the Development Evaluation and Regulation of Pesticides. F. A. Wood*, University of Florida, Gainesville (126).
- 3:50 Summary and Discussion: S. Fertig, USDA-ARS, Beltsville, MD.
- 4:30 WSSA Business Meeting (Tuttle Ballroom)

WEDNESDAY PM, FEBRUARY 8

SECTION VII TEACHING AND EXTENSION SYMPOSIUM

New Approaches to Information Transfer

Location: Flagler Ballroom

Section Chairman: C. L. Elmore, University of California, Davis.

Moderator: J. V. Parochetti, USDA, Washington, DC.

- 1:00 New Methods, New Modes and Innovative Approaches to Successful Cooperation and Education Programs in Weed Science. James V. Parochetti, US Department of Agriculture, Washington, DC, and Clyde L. Elmore, University of California, Davis (127).
- 1:15 Extension in the 80s--An Overview. Denzil O. Clegg, Associate Administrator, Extension Service, USDA, Washington, DC.
- 1:30 Role and Responsibilities of Extension Specialists. Vivan Jennings, Associate Director, Iowa State University Cooperative Extension Service, Ames.
- 1:45 Industry's Role in Education and Technology Transfer. William D. Sewell, Chevron Chemical Co., Richmond, CA.
- 2:00 Discussion Leader, Warren Shaw, USDA, Beltsville, MD.
- 2:15 Recess
- 2:30 Changes in Production Practices and Economics Affecting Education and Technology Transfer in Weed Science in the Next Decade. Orvin Burnside, University of Nebraska, Lincoln.
- 2:45 Role of ARS Technology Transfer. Andrew M. Cowan, USDA-ARS, Peoria, IL.
- 3:00 Extension Publications, Preparation and Distribution Under Restricted Resources--New Roles and New Techniques (User Charges). Ovid Bay, Extension Service, USDA, Washington, DC.
- 3:15 A State's Perspective on Education and Technology Transfer Techniques. Ellery Knake, University of Illinois, Urbana.
- 3:30 FAIRS--Florida Agricultural Information Retrieval System. D. Teem, H. Beck, F. Johnson, and J. Stimac, University of Florida, Gainesville.
- 3:45 Demonstration of Florida Retrieval System.
- 4:15 Open
- 4:30 WSSA Business Meeting (Tuttle Ballroom)

WEDNESDAY PM, FEBRUARY 8

SECTION IX ECOLOGY AND BIOLOGICAL CONTROL

Location Orchid C and D

Section Chairman and Moderator: G. R. Leather, USDA-ARS, Frederick, MD.

- 1:00 The Six-Year Effect of Weed Management Levels and Multiple-Cropping Sequences on Weed Populations. C. C. Dowler*, N. C. Glaze, and A. W. Johnson, USDA-ARS, Tifton, GA (142).
- 1:15 Growth of Red Rice Biotypes (*Oryza sativa* L.) and Interference of Strawhull Red Rice with Rice. A. Diarra*, R. J. Smith, Jr., and R. E. Talbert, University of Arkansas, Fayetteville, and USDA-ARS, Stuttgart (143).
- 1:30 Identification of Competitive Winter Wheat (*Triticum aestivum* L.) Selections to Field Pennycress (*Thlaspi arvense* L.) and Downy Brome (*Bromus tectorum* L.). Challajah*, O. C. Burnside, G. A. Wicks, and V. A. Johnson, University of Nebraska and USDA-ARS, Lincoln (144).
- 1:45 The Effect of Rye (*Secale cereale* L.) Mulch, Tillage and Crop Competition on Weed Densities in Three No-Till Systems. D. G. Shilling* and A. D. Worsham, North Carolina State University, Raleigh (145).
- 2:00 Allelopathic Activity of Rye (*Secale cereale* L.) Residues and Extracts. J. P. Barnes* and A. R. Putnam, Michigan State University, East Lansing (146).
- 2:15 Phytotoxicity of Products from Rhizospheres of Sorghum-Sudangrass Hybrids (SSH). D. R. Forney* and C. L. Foy, Virginia Polytechnic Institute and State University, Blacksburg (147).
- 2:30 Recess
- 2:45 Allelopathic Effects of Lantana (*Lantana camara* L.). N. R. Achhireddy* and M. Singh, University of Florida, IFAS, Lake Alfred (148).
- 3:00 Collection and Bioassay of Allelopathic Compounds from Root Exudates of Axenic Dwarf Spikerush [*Eleocharis coloradoensis* (Britt.) Gilly] Cultures. J. M. DiTomaso* and F. M. Ashton, University of California, Davis (149).
- 3:15 Allelopathic Exudates from Velvetleaf (*Abutilon theophrasti* Medic.) Trichomes. R. L. Houtz*, A. R. Putnam, and S. K. Ries, Michigan State University, East Lansing (150).
- 3:30 Inhibition of Nodulation and Nitrogen Fixation in Several Species of Legumes by Quackgrass [*Agropyron repens* (L.) Beauv.]. L. A. Weston* and A. R. Putnam, Michigan State University, East Lansing (151).
- 3:45 A Survey of Soil Microorganisms for Herbicidal Activity. R. M. Heisey*, J. DeFrank, and A. R. Putnam, Michigan State University, East Lansing (152).
- 4:00 Examination of Microorganisms and Deterioration Resistance Mechanisms Associated with Velvetleaf (*Abu-*

tilon theophrasti Medic.) Seeds. R. J. Kremer* and R. J. Aldrich, University of Missouri and USDA-ARS, Columbia (153).

4:30 WSSA Business Meeting (Tuttle Ballroom)

WEDNESDAY PM, FEBRUARY 8

SECTION X PHYSIOLOGY

Location: Jasmine

Section Chairman and Moderator: R. D. Gruenhagen, Yardley, PA.

- 1:00 Uptake, Translocation and Metabolism of Flurazone (MON-4606) Safener and Acetochlor (MON-097) Herbicide in Grain Sorghum. Lucinda Jackson*, John Yopp, and George Kapsuta, Southern Illinois University, Carbondale (189).
- 1:15 Physiological Studies with the Herbicide Safeners CGA-43089 and CGA-92194. P. Zama* and K. K. Hatzios, Virginia Polytechnic Institute and State University, Blacksburg (190).
- 1:30 Biochemical Responses of Inbred and Hybrid Corn (*Zea mays* L.) to R-25788 and Its Distribution with ETPC in Corn Seedlings. M. M. Lay* and A. M. Niland, Stauffer Chemical Co., Richmond, CA (191).
- 1:45 Possible Multiple Effects of PC-671 (ASSIST) in Prevention of Metribuzin Injury to Soybeans. B. D. Riggle* and Donald Penner, Michigan State University, East Lansing (192).
- 2:00 Morphological Differences Between Water Impermeable and Permeable Regions of Coats of Certain Weed Seeds. G. H. Egley and R. N. Paul, Jr., USDA-ARS, Southern Weed Science Laboratory, Stoneville, MS (193).
- 2:15 Temperature Control of Germination and its Possible Role in the Survival of a Nondormant Population of Wild Oat *Avena fatua* L. A. I. Hsiao*, R. Sawhney and W. A. Quick, Agriculture Canada, Research Station, Regina, Saskatchewan (194).
- 2:30 Characterization of Some Phytotoxic Components of Rye (*Secale cereale* L.). D. G. Shilling* and A. D. Worsham, North Carolina State University, Raleigh (195).
- 2:45 Recess
- 3:00 Effect of Shade on Soybean Photosynthesis and Growth. E. W. Stoller*, USDA-ARS, and J. T. Woolley, University of Illinois, Urbana (196).
- 3:15 The Influence of Weeds on Nutrient Availability and Uptake by Corn and Soybeans. M. A. Elakkad*, R. Adams, and R. Behrens, University of Minnesota, St. Paul (197).

- 3:30 The Effect of Wheat Clover Crop Age on the Response of No-Till Corn to Glyphosate. John L. Spilisbury* and A. Douglas Worsham, North Carolina State University, Raleigh (199).
- 3:45 Physiological Response of Lentil Cultivars and Associated Weeds to Metribuzin. E. E. Hassanein, Weed Control Research Section, Agriculture Research Center, Giza, Cairo, Egypt, D. R. Gealy* and L. A. Morrow, USDA-ARS, Pullman, WA (200).
- 4:00 Section Business Meeting
- 4:30 WSSA Business Meeting (Tuttle Ballroom)

THURSDAY AM, FEBRUARY 9

SECTION I-A AGRONOMIC CROPS

Location: Tuttle Ballroom

Section Chairman: J. M. Chandler, Texas Agricultural Experiment Station, College Station.

Moderator: A. R. Martin, University of Nebraska, Lincoln.

- 8:15 Influence of Soil Compaction on Trifluralin Phytotoxicity to Corn. A. G. Martin, T. N. Jordan*, and G. C. Steinhardt, Purdue University, West Lafayette, IN (24).
- 8:30 Influence of Mefluidide on Wheat Yield Components. B. J. Hook* and L. M. Kitchen, Louisiana Agricultural Experiment Station, Baton Rouge (25).
- 8:45 Multiple Applications of Cyanazine on Field Corn. L. E. Whitself*, Shell Development Co., Modesto, CA (26).
- 9:00 Topical Phytotoxicity of Trifluralin, Pendimethalin, Fluchloralin, and Metolachlor to Cotton. J. R. Abernathy*, J. W. Keeling, and J. D. Reeves, Texas Agricultural Experiment Station, Lubbock (27).
- 9:15 The Effect of Adjuvants in Combination with Pendimethalin for the Postemergence Control of Velvetleaf (*Abutilon theophrasti* Medic). R. M. Herrick* and R. D. Ilnicki, Rutgers University, NJ (28).
- 9:30 Recess
- 9:45 Effect of Application Factors on Postemergence Phytotoxicity of Fluazifop-butyl, Haloxyfop-methyl, and Sethoxydim. D. D. Buhler* and O. C. Burnside, University of Nebraska, Lincoln (29).
- 10:00 A Comparison of Several New Postemergence Grass Herbicides. G. Gowgani* and R. Falconer, California Polytechnic State University, San Luis Obispo (30).
- 10:15 Soybean Oil as a Carrier or Adjuvant for Postemergence Herbicides. L. R. Oliver*, V. E. Banks, and J. T. Walker, University of Arkansas, Fayetteville (31).
- 10:30 Soybean Oil Concentrate Applications on Selected Plant Species. C. B. Coffman* and W. A. Gentner, USDA-ARS, Beltsville, MD (32).

- 10:45 Influence of Surfactant Usage on the Efficacy of Acifluorfen-Sodium in Soybeans. R. D. McLaughlin*, Rhone-Poulenc Inc., Monmouth Junction, NJ (33).
- 11:00 Discussion
- 11:30 WSSA Awards Luncheon

THURSDAY AM, FEBRUARY 9

SECTION I-B AGRONOMIC CROPS

Location: Orchid C and D

Section Chairman and Moderator: J. M. Chandler, Texas Agricultural Experiment Station, College Station.

- 8:15 Early Preplant Herbicide Application for No-Till Corn and Soybeans. R. S. Fawcett, Iowa State University, Ames (34).
- 8:30 Trifluralin for Weed Control in a Fallow-Wheat Rotation. J. Anderson*, A. R. Irvine, W. R. McGregor, and M. F. McLaughlin, Elanco, Winnipeg, Manitoba (35).
- 8:45 Winter Annual Weed Control in Dryland, Reduced Tillage Systems. S. E. Blank, Monsanto Agricultural Products Co., Kennewick, WA (36).
- 9:00 Effects of Tillage and Weed Management on Yields of Double-Cropped Wheat and Soybeans. M. P. Mascinonica* and H. P. Wilson, Virginia Truck and Ornamentals Research Station, Painter (37).
- 9:15 The Effect of Sicklepod (*Cassia obtusifolia* L.) Population Density on Water Usage in Soybeans. T. N. Tripp* and P. A. Banks, University of Georgia, Athens (38).
- 9:30 Recess
- 9:45 Weed Control in Ridge-Till-Planted Soybeans and Grain Sorghum. D. L. Regehr* and K. A. Janssen, Kansas State University, Manhattan (39).
- 10:00 Weed Control Strategies for Corn/Soybean Rotations and Conservation Tillage. L. M. Wax*, USDA-ARS, and J. W. Hummel, University of Illinois, Urbana (40).
- 10:15 Serial Herbicides for No-till Soybeans. H. D. Kerr* and C. J. Barnes, University of Missouri, Columbia (41).
- 10:30 The Use of Chlorsulfuron and DPX T6376 for Control of Wild Garlic (*Allium vineale* L.) in a Winter Wheat-Soybean Double Crop Rotation. A. R. Leys* and F. W. Slife, University of Illinois, Urbana (42).
- 10:45 Influence of Annual Grass Weed Control on Soil Moisture in Chemical and Conventional Fallow Systems. L. A. Morrow* and R. I. Papendick, USDA-ARS, Pullman, WA (43).
- 11:00 Discussion
- 11:30 WSSA Awards Luncheon

THURSDAY AM, FEBRUARY 9

SECTION II HORTICULTURE

- Location: Orchid A and B
Section Chairman and Moderator: C. E. Beste, University of Maryland, College Park.
- 8:00 Control of Certain Resistant Weeds in Cranberries. A. Y. Shawa*, Washington State University, Pullman (75).
- 8:15 Treatment of Bracken Fern (*Pteridium aquilinum*) with Asulam in Lowbush Blueberry (*Vaccinium angustifolium*) Fields. D. E. Yarborough* and A. A. Ismail, University of Maine, Orono (76).
- 8:30 Weed Control with Hexazinone in Lowbush Blueberries. K. I. N. Jensen, Agriculture Canada, Kentville, Nova Scotia, and F. Huston*, DuPont Canada, Streetsville, Ontario (77).
- 8:45 Use of Napropamide for Strawberry Weed Control in Coastal British Columbia. J. A. Freeman*, Agriculture Canada, Research Station, Agassiz, British Columbia (78).
- 9:00 Weed Control in Blackberry and Blueberry. P. K. Biswas*, S. Ray, M. Burns, and M. A. Wilson, Tuskegee Institute, Tuskegee, AL, and J. M. Spiers, USDA, Poplarville, MS (79).
- 9:15 Discussion/Section Business Meeting
- 9:30 Recess
- 9:45 Weed Control Trials in Tomato Fields. M. A. Zaki*, University of Cairo, Giza, Egypt (80).
- 10:00 Hemp Broomrape (*Orobanche ramosa* L.) Control in Tomato Fields by Fertilizers. B. E. Abu-Irmaileh, University of Jordan, Amman (81).
- 10:15 Metribuzin Safening with Activated Carbon in Pepper. B. A. Majek*, Rutgers University, New Brunswick, NJ (82).
- 10:30 Chemical Weed Control in Transplanted Celery Grown on Organic Soils. J. A. Dusky*, University of Florida, AREC, Belle Glade (83).
- 10:45 Herbicide Alternatives to Trifluralin Use for Weed Control in Transplanted Cabbage. P. C. Bhowmik and E. N. McGlew*, University of Massachusetts, Amherst (84).
- 11:00 Variation in Tolerance of Three Bean Types (*Phaseolus vulgaris*) to Metolachlor. G. A. Meyer, D. T. Warholc*, and R. D. Sweet, Cornell University, Ithaca, NY (85).
- 11:15 Discussion
- 11:30 WSSA Awards Luncheon

THURSDAY AM, FEBRUARY 9

SECTION V AQUATIC AND MARGINAL WEEDS

- Location: Hibiscus B
Section Chairman and Moderator: J. E. Gallagher, Union Carbide Agricultural Products Co., Inc., Research Triangle Park, NC.
- 9:00 Control of Aquatic Weeds in Drawn-down Canals with Sulfometuron (Oust®) and Glyphosate (Rodeo®). L. W. J. Anderson* and N. Dechoretz, USDA-ARS, University of California, Davis (105).
- 9:15 Effect of Herbicide Rate and Spray Volume on Glyphosate Phytotoxicity. T. K. Van*, USDA-ARS, V. V. Vandiver, Jr., University of Florida, and K. K. Steward, USDA-ARS, Fort Lauderdale (106).
- 9:30 Sodium Carbonate Peroxyhydrate as a New Algicide. P. C. Quimby, Jr.*, USDA-ARS, Stoneville, and S. H. Kay, Delta State University, Cleveland, MS (107).
- 9:45 Discussion and Business Meeting
- 10:00 Recess
- 10:15 Long Term Continuous Control of Submersed Aquatic Macrophytes. R. C. Hiltibran, University of Illinois, Urbana (108).
- 10:30 Stimulation of Sprouting of Hydrilla [*Hydrilla verticillata* (L.F.) Royle] Tubers with Sodium Hypochlorite. D. L. Sutton, University of Florida, Fort Lauderdale (109).
- 10:45 Uptake and Effect of Three Copper Formulations on *Hydrilla verticillata* Royle (L.F.) Regrowth. L. W. J. Anderson, N. Dechoretz*, G. L. Darmstadt, and D. E. Bayer, USDA-ARS, Aquatic Weed Control Research Laboratory and University of California, Davis (110).

THURSDAY AM, FEBRUARY 9

SECTION IX ECOLOGY AND BIOLOGICAL CONTROL

- Location: Hibiscus A
Section Chairman: G. R. Leather, USDA-ARS, Frederick, MD.
Moderator: A. R. Putnam, Michigan State University, East Lansing.
- 8:00 Toxicological Investigations on Big Trefoil (*Lotus pedunculatus* Cav.), Devil's Backbone (*Kalanchoe daigremontiana* Hamet and Perrier), and Species of *Crotalaria*. M. C. Williams, USDA-ARS, Logan, UT (154).
- 8:15 Evaluation of Resource Components for Predicting Coniferous Growth. W. T. Lanini*, Pennsylvania State University, University Park, and S. R. Radosovich, Oregon State University, Corvallis (155).

SECTION X
PHYSIOLOGY

- 8:30 Temperature Effects on Growth and Leaf Production in Sicklepod (*Cassia obtusifolia* L.), Hemp Sesbania [*Sesbania exaltata* (Raf.) Cory], and Showy Croton (*Crotalaria spectabilis* Roth). E. P. Flint*, Duke University, D. T. Patterson, USDA-ARS, G. H. Riechers, and J. L. Beyers, Duke University, Durham, NC (156).
- 8:45 The Influence of Temperature and Seedbed Tillage on the Emergence and Early Growth of Corn and Two Weed Species, Giant Foxtail (*Setaria faberi* Herrm.) and Velvetleaf (*Abutilon theophrasti* Medic.). K. P. Schaefer* and D. W. Staniforth, Iowa State University, Ames (157).
- 9:00 Potential for North-South Spreading of Velvetleaf (*Abutilon theophrasti* Medic.). R. N. Andersen*, R. M. Menges, and J. S. Conn, USDA-ARS, St. Paul, MN, Weslaco, TX, and Fairbanks, AR (158).
- 9:15 Effects of Postemergent Chemicals on Velvetleaf (*Abutilon theophrasti* Medic.) Seed Production and Germination. D. Kintner* and R. J. Aldrich, University of Missouri, Columbia (159).
- 9:30 Recess
- 9:45 Effects of Temperature and Photoperiod on Common Crupina (*Crupina vulgaris* Cass.). D. T. Patterson, USDA-ARS, Durham, NC (160).
- 10:00 Reproductive Characteristics of Cutleaf Groundcherry (*Physalis angulata* L. var. *angulata*), Smooth Groundcherry (*Physalis subglabrata* Mack. and Bush), and Eastern Black Nightshade (*Solanum ptycanthum* Dun.). W. W. Witt* and C. E. Thomson, University of Kentucky, Lexington (161).
- 10:15 Weed Seed Maturity in Three Grasses. Ann M. Wiese* and L. K. Binning, University of Wisconsin, Madison (162).
- 10:30 Enhanced Germination of Dormant Wild Mustard Seed (*Brassica kaber* D.C.) by Phthalimides AC-94,377 and AC-99,524. W. W. Donald* and R. A. Hoerauf, USDA Metabolism and Radiation Research Laboratory, Fargo, ND (163).
- 10:45 Agar Increases Barnyardgrass [*Echinochloa crus-galli* (L.) Beauv.] Seed Germination. S. S. Sung*, G. R. Leather, and M. G. Hale, Virginia Polytechnic Institute and State University, Blacksburg, and USDA-ARS, Frederick, MD (164).
- 11:00 Seed-Soil Microsite Characteristics in Relation to Weed Seed Germination. M. R. Pareja* and D. W. Staniforth, Iowa State University, Ames (165).
- 11:30 WSSA Awards Luncheon

Location: Jasmine

Section Chairman: R. D. Gruenhagen, Yardley, PA.

Section Moderator: Gary Gardner, Shell Development Co., Modesto, CA.

- 8:00 Diallate Inhibition of Gibberellin Precursor Biosynthesis in Sorghum Coleoptiles. R. E. Wilkinson, Georgia Station, Experiment (201).
- 8:15 The Influence of Gibberellic Acid on the Phytotoxic Response of Fluazifop-butyl in Johnsongrass [*Sorghum halepense* (L.) Pers.]. R. D. Lee* and L. E. Bendixen, Ohio State University, Columbus (202).
- 8:30 Protein and Nucleic Acid Synthesis in Corn and Soybean as Affected by Fluazifop. R. S. Perogy* and S. Glenn, University of Maryland, College Park (203).
- 8:45 Studies on the Mode of Action of the Herbicides HOE-39866 and SC-0224. R. R. Bellinder* and K. K. Hatzios, Virginia Polytechnic Institute and State University, Blacksburg, and H. P. Wilson, Virginia Truck and Ornamentals Research Station, Painter (204).
- 9:00 Effect of Aromatic Amino Acids on the Growth Inhibition of Inflated Duckweed (*Lemna gibba* L.) by SC-0224 (trimethylsulfonium carboxymethylaminomethylphosphonate). W. E. Cooley* and C. L. Foy, Virginia Polytechnic Institute and State University, Blacksburg (205).
- 9:15 Diphenyl Ether-Induced Lipid Peroxidation in Higher Plants. K. J. Kunert* and P. Böger, Universität Konstanz, Konstanz, West Germany (206).
- 9:30 The Effect of Some Herbicides and Surfactants on Plant Membrane Permeability. C. F. Mischke*, C. E. Bare, and J. L. Hilton, USDA-ARS, Beltsville, MD (207).
- 9:45 Recess
- 10:00 Effects of Alachlor on Anthocyanin and Lignin Biosynthesis in Sorghum Mesocotyls. W. T. Molin*, E. Anderson, and C. A. Porter, Monsanto Agricultural Products Co., St. Louis, MO (208).
- 10:15 Effect of DCPA on the Ultrastructure and Cytokinesis in Oat Roots. J. D. Holmsen* and F. D. Hess, Purdue University, West Lafayette, IN (209).
- 10:30 *In Vitro* Activity of Sorghum-Selective Fluorophenyl Urea Herbicides. Gary Gardner*, K. H. Pilgram, Lloyd J. Brown, and G. A. Bozarth, Shell Development Co., Modesto, CA (210).
- 10:45 Triazine Herbicide Resistance in Photosynthetic Bacteria. A. E. Brown*, Auburn University, AL, C. W. Gilbert, R. Guy, and C. J. Arntzen, Michigan State University, East Lansing (211).
- 11:00 Molecular Analysis of Triazine Herbicide Receptor Proteins. C. J. Arntzen*, J. Hirschberg, C. W. Gilbert, and L. McIntosh, Michigan State University, East Lansing (212).

- 11:15 Discussion
 11:30 WSSA Awards Luncheon

THURSDAY AM, FEBRUARY 9

SECTION XI SOIL ASPECTS SYMPOSIUM

Assessment of Methodology for Field Evaluation of Herbicide Behavior in Soils

Location: University Auditorium
 Chairman: R. E. Talbert, Department of Agronomy, University
 of Arkansas, Fayetteville.
 Moderator and Organizer: W. C. Koskinen, USDA-ARS,
 Southern Weed Science Laboratory, Stoneville, MS.

- 8:00 Plant Factors in Examining Fate of Herbicides in Soil. A. P. Appleby, Oregon State University, Corvallis (237).
 8:30 Using Field Measurements to Assess Herbicide Movement in Soil. W. J. Farmer*, W. A. Jury, University of California, and W. F. Spencer, USDA-ARS, Riverside (238).
 9:00 Assessment of Methodology for Characterization of Herbicide Degradation Under Field Conditions. H. H. Cheng* and R. G. Lehmann, Washington State University, Pullman (239).
 9:30 Recess
 9:45 Application of ¹⁴C-Labeled Herbicides in Lysimeter Studies. F. Fuhr, Nuclear Research Centre Julich GmbH, Julich, Federal Republic of Germany (240).
 10:15 Basic Concepts of Modeling Herbicide Rate in the Root Zone. P. S. C. Rao*, University of Florida, Gainesville, and R. J. Wagenet, Cornell University, Ithaca, NY (241).
 10:45 Degradation Data for Modeling Fate in Soil. D. A. Laskowski*, C. N. Park, T. R. Oliver, and P. J. McCaff, Environmental Chemistry, Agricultural Products, The Dow Chemical Co., Midland, MI (242).
 11:15 Discussion (The Symposium continues at 2:00 PM)
 11:30 WSSA Awards Luncheon

THURSDAY NOON, FEBRUARY 9

WSSA AWARDS LUNCHEON 11:30-1:30

Location: Brickell, Flagler, and Monroe Ballroom
 Presiding: Alan G. Dexter, North Dakota State University, Fargo.
 Special Seating: Tables have been set up near the front of the Ballroom for Past Presidents, WSSA Fellows, and Honorary Members.

Presentation of Honors and Awards

- Award for Outstanding Article in Weed Science
 Outstanding Graduate Student Award
 Outstanding Teaching Award
 Outstanding Research Worker Award
 Outstanding Extension Worker Award
 Outstanding Young Weed Scientist Award
 Outstanding Photo Award
 WSSA Fellow Awards

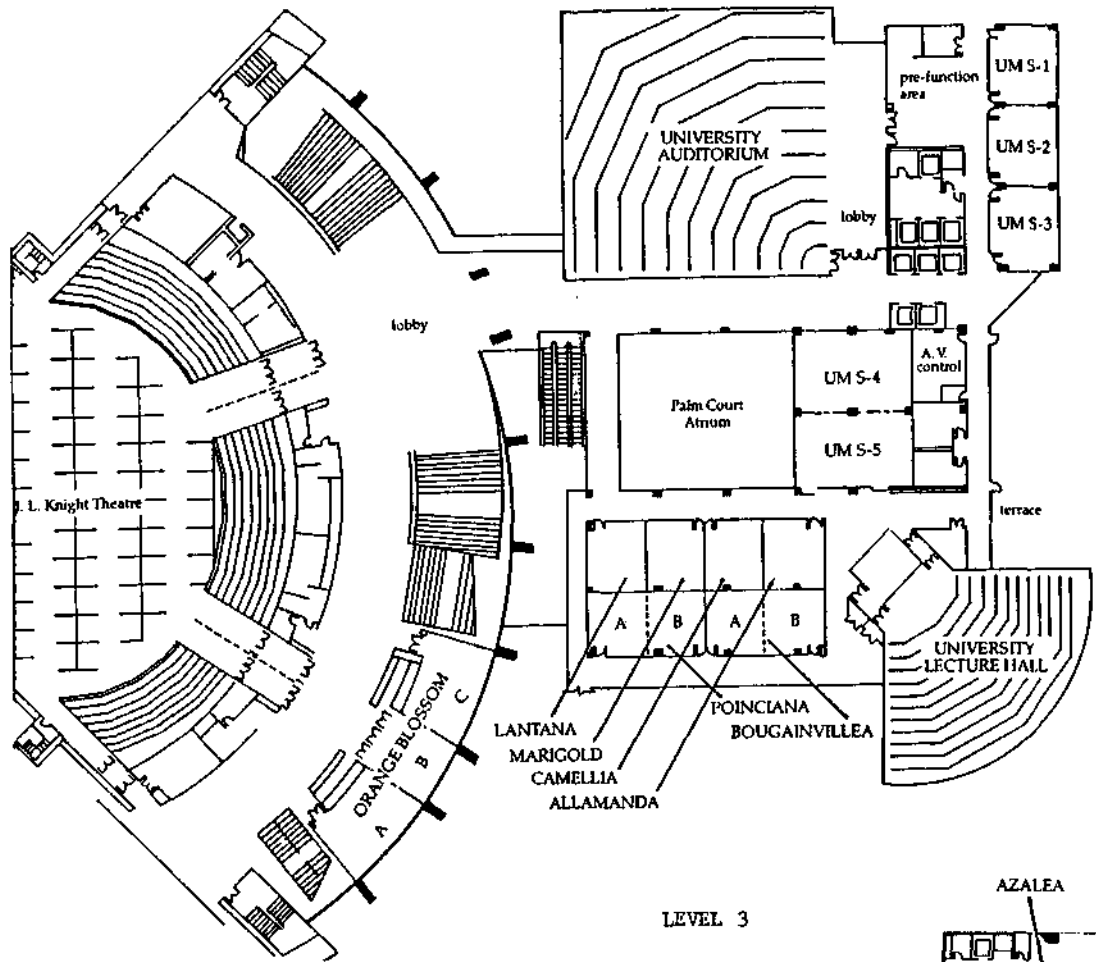
Passing the Gavel

THURSDAY PM, FEBRUARY 9

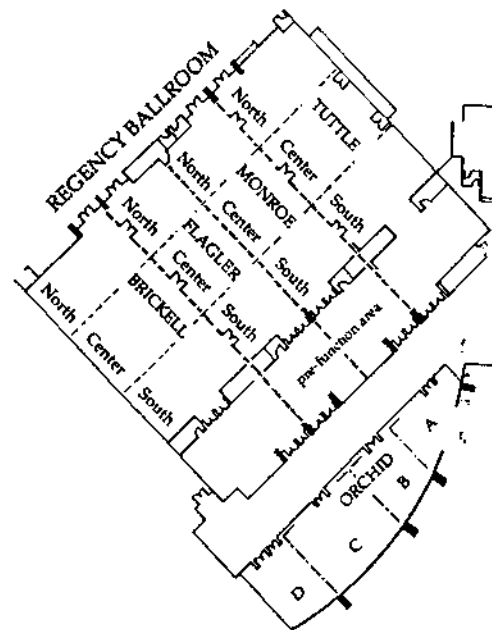
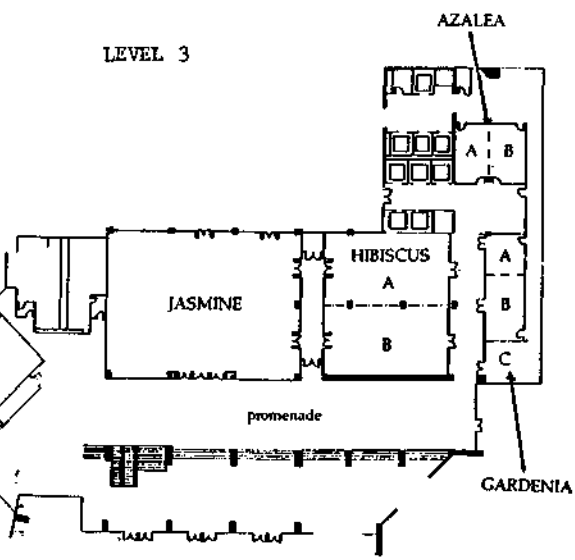
SECTION I AGRONOMIC CROPS

Location: Tuttle Ballroom
 Section Chairman: J. M. Chandler, Texas Agricultural Experiment Station, College Station.
 Moderator: D. L. Ilyzak, Stauffer Chemical Co., Austin, TX.

- 2:00 Postemergence Weed Control with Bromoxynil on Corn. L. F. Figuerola*, Rhone-Poulenc Inc., Monmouth Junction, NJ (44).
 2:15 SD 95481, A New Soil-Applied Herbicide for Use in Soybeans, Cotton, and Peanuts. J. W. May* and J. R. Goss, Shell Development Co., Modesto, CA (45).
 2:30 AssureTM—New Postemergence Grass Herbicide for Use in Soybeans, Cotton, and Other Broadleaf Crops. A. J. Parsells*, M. M. Fawzi, J. S. Claus, and J. C. Summers, E. I. DuPont de Nemours and Co., Inc., Wilmington, DE (46).
 2:45 Weed Control in Soybeans with DPX-6025. T. Wierke* and S. Glenn, University of Maryland, College Park (47).
 3:00 DPX-F6025—A New Selective Soybean Herbicide. H. L. Ploeg*, A. D. Wolf, and J. R. C. Leavitt, E. I. DuPont de Nemours and Co., Inc., Wilmington, DE (48).
 3:15 Recess
 3:30 AC 263,499—A New Broad Spectrum Herbicide for Soybeans and Other Leguminous Crops. T. Malefyt*, P. A. Marc, K. Umeda, M. Los, and P. L. Orwick, American Cyanamid Co., Princeton, NJ (49).
 3:45 SCEPTER[®] Herbicide (AC 252,214): Results of 1983 U.S. Field Trials. P. K. Martin, American Cyanamid Co., Princeton, NJ (50).
 4:00 FMC 57020—A New Broad Spectrum Herbicide for Soybeans. D. B. Carlson*, D. H. Dawe, and R. A. Robinson, FMC Corporation, Philadelphia, PA (51).
 4:15 Control of Grass and Broadleaf Weeds in Soybeans with FMC 57020. T. R. Warfield*, S. K. Bellman, H. L. Guscar, and M. T. Hillson, FMC Corporation, Philadelphia, PA (52).
 4:30 Discussion/Section Business Meeting
 4:45 Adjourn



LEVEL 3



LEVEL 1

HOTEL REGISTRATION IS ON LEVEL 2

THURSDAY PM, FEBRUARY 9

SECTION III
TURF AND ORNAMENTALS

Location: Hibiscus B

Section Chairman and Moderator: Norman C. Glaze, USDA, ARS, Tifton, GA.

- 2:00 Controlled-Release Preemergence Herbicide Formulations for Annual Grass Control in Kentucky Bluegrass Turf. D. R. Chalmers*, H. J. Hopen, and A. J. Turgeon, University of Illinois, Urbana-Champaign (86).
- 2:15 Comparative Response of Triclopyr-Phenoxy Mixtures for Control of Broadleaf Weeds in Cool Season Lawn Turfs. K. A. Hurto, Chemlawn Corporation, Columbus, OH; A. B. Hall*, Dow Chemical USA, Cincinnati, OH; and M. J. Thielen, Chemlawn Corporation, Columbus, OH (87).
- 2:30 MON 4621 and MON 4622: New Growth Retardants for Cool Season Turf Grasses. P. C. Bhowmik*, University of Massachusetts, Amherst (88).
- 2:45 Preemergence Crabgrass (*Digitaria ischaemum*) Control in Bluegrass. R. P. Freeborg* and W. H. Daniel, Purdue University, West Lafayette, IN (89).
- 3:00 Competitive Stress Effects of Annual Bluegrass (*Poa annua* L.) Perennial Ryegrass and Kentucky Bluegrass Cultivars. D. K. Bell* and K. A. Hurto, University of Massachusetts, Amherst (90).
- 3:15 Discussion
- 3:30 Recess
- 3:45 Influence of Oxadiazon on Growth of Bentgrass Greens. S. W. Bingham*, J. R. Hall III, Virginia Polytechnic Institute and State University, Blacksburg, and J. R. Fisher, Farmington Country Club, Charlottesville (91).
- 4:00 Response of Winter-Applied Postemergence Herbicides on Spring Growth of Bermudagrass (*Cynodon dactylon*). B. J. Johnson*, University of Georgia, Georgia Station, Experiment (92).
- 4:15 Multiple Herbicide Applications for Azaleas. C. E. Beste*, University of Maryland, College Park, and J. Ray Frank, USDA, ARS, Frederick (93).
- 4:30 Selectivity of Glyphosate and Triclopyr in Christmas Tree Plantings. J. F. Ahrens, Connecticut Agricultural Experiment Station, Windsor (94).
- 4:45 Discussion/Section Business Meeting
- 5:00 Adjourn

THURSDAY PM, FEBRUARY 9

SECTION IV
PASTURES, RANGELAND, FORESTS,
RIGHTS-OF-WAY, AND INDUSTRIAL SITES

Location: Orchid C and D

Section Chairman and Moderator: R. E. Meyer, USDA, ARS, College Station, TX.

- 2:00 Use of Tebuthiuron for Land-Use Conversion and Reforestation in the Southeast. A. E. Smith* and J. Silvoy, University of Georgia, Griffin (95).
- 2:15 Tebuthiuron Effects on *Artemisia* spp. and Associated Grasses. T. D. Whitson*, Oregon State University, Corvallis, and H. P. Alley, University of Wyoming, Laramie (96).
- 2:30 Sagebrush (*Artemisia tridentata*) Control with Tebuthiuron. K. C. McDaniel* and J. Balliette, New Mexico State University, Las Cruces (97).
- 2:45 Tebuthiuron Residues in Surface Water Following Application to a Rangeland Watershed. B. J. Eaton*, R. S. Bjerregaard, M. D. Hammond, and D. G. Saunders, Eli Lilly and Co., Greenfield, IN (98).
- 3:00 Rolling Carpet Applicator for Woody Plant Control. H. A. Holt*, H. G. Gibson, L. D. Gaultney, G. W. Krutz, and M. J. Maskal, Purdue University, West Lafayette, IN (104).
- 3:15 Section Business Meeting
- 3:30 Recess
- 3:45 Control of False Broomweed (*Ericameria austrotexana*) with a Carpet Roller. H. S. Mayeux, Jr., USDA, ARS, Temple, TX (100).
- 4:00 Inhibition of Dyer's Woad (*Isatis tinctoria* L.) Seed Development by Chlorsulfuron and Related Candidate Herbicides. J. O. Evans* and R. W. Gunnell, Utah State University, Logan (99).
- 4:15 The Use of Herbicides for the Establishment of Alfalfa (*Medicago sativa* L.). R. G. Harvey and T. M. Ahrens*, University of Wisconsin, Madison (101).
- 4:30 Management of Pastures Infested with Yellow Hawkweed (*Hieracium pratense* Tausch). R. H. Callihan*, R. L. Shely, and D. C. Thill, University of Idaho, Moscow (102).
- 4:45 Carbohydrate Content in Leafy Spurge (*Euphorbia esula*) Root as Influenced by Temperature. R. G. Lym* and C. G. Messersmith, North Dakota State University, Fargo (103).
- 5:00 Discussion/Adjourn

THURSDAY PM, FEBRUARY 9

SECTION VI REGULATORY ASPECTS

Location: Orchid A and B

Section Chairman and Moderator: R. E. Eplee, USDA, APHIS, PPQ, Whiteville, NC.

- 2:00 A System for Simulating Runoff Water Contamination by Soil-Applied Herbicides. R. Don Wauchope, USDA/ARS, Southern Weed Science Laboratory, Stoneville, MS (111).
- 2:15 Herbicide Use Patterns in California, 1971-1972. M. Y. Li* and L. Lasarow, University of California, Davis (112).
- 2:30 2,4-D Exposure of Forest Workers Using Ground Application Equipment. T. L. Lavy*, University of Arkansas, Fayetteville, L. A. Norris, U.S. Forest Service, Corvallis, OR, and J. D. Mattice, University of Arkansas, Fayetteville (113).
- 2:45 A Report of the Noxious Weed Technical Advisory Group. Robert E. Eplee* and Paul F. Sand, USDA, APHIS, PPQ, Whiteville, NC, and Hyattsville, MD (114).
- 3:00 Potentially Serious Weeds in the United States. Paul F. Sand, USDA, APHIS, PPQ, Hyattsville, MD (115).
- 3:15 Recess
- 3:30 Grower and Landowner Acceptance of a Proposed Eradication Project for Goatsrue (*Galega officinalis* L.). M. L. Ashcroft and J. O. Evans*, Utah State University, Logan (116).
- 3:45 Current Status of Hemp Broomrape (*Orobanche ramosa* L.) in Texas. Marion A. Langston* and Andy Feild, USDA, APHIS, PPQ, Little Rock, SC, and Texas Department of Agriculture, Austin (117).
- 4:00 The Cooperative Witchweed (*Striga lutea* Lour.) Eradication Program. Paul F. Sand*, USDA, APHIS, PPQ, Hyattsville, MD (118).
- 4:15 Discussion/Section Business Meeting

THURSDAY PM, FEBRUARY 9

SECTION IX ECOLOGY AND BIOLOGICAL CONTROL

Location: Hibiscus A

Section Chairman and Moderator: G. R. Leather, USDA-ARS, Frederick, MD.

- * 2:00 A Long-Term Field Study of Vegetative Succession Following Repetitive Application of Phenoxy Herbicides. A. L. Young*, Veterans Administration, Washington, DC, and C. E. Thalken, Brooks AFB, TX (166).
- 2:15 Potential for Using Weed Seeds in the Soil to Predict

Future Weed Problems. R. G. Wilson* and E. D. Kerr, University of Nebraska, Scottsbluff (167).

- 2:30 Growth and Reproductive Characteristics of Field Bindweed (*Convolvulus arvensis* L.) Biotypes. S. C. Weller*, Purdue University, West Lafayette, IN, and F. P. DeGennaro, DuPont Agrichemicals, Wilmington, DE (168).
- 2:45 Differential Susceptibility of Field Bindweed (*Convolvulus arvensis* L.) Biotypes to Glyphosate. F. P. DeGennaro*, DuPont Agrichemicals, Wilmington, DE, and S. C. Weller, Purdue University, West Lafayette, IN (169).
- 3:00 Autecology of Horsenettle (*Solanum carolinense*) in Bermudagrass Pastures. R. L. Nichols*, T. P. Gaines, R. E. Lynch, N. A. Minton, and H. D. Wells, USDA-ARS, and University of Georgia, Tifton (170).
- 3:15 Alteration of Growth and Competitive Ability of Common Purslane (*Portulaca oleracea* L.) by Purslane Sawfly. R. F. Norris*, University of California, Davis (171).
- 3:30 Recess
- 3:45 Host Specificity of Selected Pathogens of Quackgrass [*Agropyron repens* (L.) Beauv.]. M. G. Sampson*, Nova Scotia Agricultural College, Truro, and A. K. Watson, Macdonald College, McGill University, Ste-Anne-de-Bellevue, Quebec (172).
- 4:00 Stress Evaluation and Biological Control of Canada Thistle [*Cirsium arvense* (L.) Scop.]. S. F. Forsyth* and A. K. Watson, Macdonald College, McGill University, Ste-Anne-de-Bellevue, Quebec (173).
- 4:15 *Collectotrichum coccodes*, a Pathogen of Velvetleaf (*Abutilon theophrasti*): A Potential Mycoherbicide. A. R. Gotlieb and M. H. Brosseau, University of Vermont, Burlington, and A. K. Watson, Macdonald College, McGill University, Ste-Anne-de-Bellevue, Quebec (174).
- 4:30 Infection Process and Disease Development of a Velvetleaf (*Abutilon theophrasti* Medic.) Pathogen. C. Poirier* and A. K. Watson, Macdonald College, McGill University, Ste-Anne-de-Bellevue, Quebec, and A. R. Gotlieb, University of Vermont, Burlington (175).
- 4:45 Section Business Meeting

THURSDAY PM, FEBRUARY 9

SECTION X PHYSIOLOGY

Location: Jasmine

Section Chairman: R. D. Gruenhagen, Yardfey, PA.

Section Moderator: R. E. Hoagland, USDA-ARS, Southern Weed Science Laboratory, Stoneville, MS.

- 2:00 Factors Affecting the Synergistic Interpretation of Alachlor and Trifluralin. S. D. Prosch* and J. B. Weber, North Carolina State University, Raleigh (213).

- 2:15 Glyphosate Effects on Metal Ion Uptake, Translocation, and Distribution in Soybean Seedlings. S. O. Duke*, K. C. Vaughn, and R. D. Wauchope, USDA-ARS, Southern Weed Science Laboratory, Stoneville, MS (214).
- 2:30 Distribution of ¹⁴C-Glyphosate in Leafy Spurge (*Euphorbia esula* L.) Roots Under Field Conditions. B. D. Maxwell*, M. E. Foley, and P. K. Fay, Montana State University, Bozeman (215).
- 2:45 Contrasting Transport Patterns of Atrazine and Glyphosate in Intact Leaves and Shoots of Sunflower. J. J. Jachetta*, Union Carbide Agricultural Products Co., Research Triangle Park, NC, A. P. Appleby and Larry Boersma, Oregon State University, Corvallis (216).
- 3:00 Long-Term Effects of Atrazine, Several Graminicides and Non-Selective Herbicides on Quackgrass [*Agropyron repens* (L.) Beauv.] Rhizomes. J. H. Dekker, University of Guelph, Guelph, Ontario (217).
- 3:15 Patterns of Translocation of Several ¹⁴C-Graminicides within Quackgrass [*Agropyron repens* (L.) Beauv.]. N. Harker* and J. H. Dekker, University of Guelph, Guelph, Ontario (218).
- 3:30 Discussion and Recess
- 3:45 Effects of Ultraviolet Irradiation on the Fate of Paraquat (1,1'-dimethyl-4,4'-bipyridylum cation) on *Cannabis* (Marijuana). Phillip G. Vincent*, USDA-ARS, Beltsville, MD, John Lydon, University of Maryland, College Park, and Walter A. Gentner, USDA-ARS, Beltsville (219).
- 4:00 Reversal of EPTC Inhibition of Arylacylamidase Activity by Oximes. R. E. Hoagland, USDA-ARS, Southern Weed Science Laboratory, Stoneville, MS (220).
- 4:15 The Effect of CDAA Pretreatments on Subsequent CDAA Toxicity to Corn. G. Ezra*, University of Guelph, Guelph, Ontario, D. G. Rusness, G. L. Lamoureux, USDA-ARS, Fargo, ND, and G. R. Stephenson, University of Guelph (221).
- 4:30 Studies on the Phytotoxicity of Isouron and Two of its Metabolites. W. T. Henry and K. K. Hatzios*, Virginia Polytechnic Institute and State University, Blacksburg (222).
- 4:45 The Primary Site of Action of the Herbicide Chlorsulfuron. T. B. Ray*, E. I. DuPont de Nemours and Co., Inc., Wilmington, DE (233).
- 5:00 Discussion/Adjourn

THURSDAY PM, FEBRUARY 9

SECTION XI Soil Aspects Symposium Continued Assessment of Methodology for Field Evaluation of Herbicide Behavior in Soil

Location: University Auditorium

- 2:00 Spatial Variability of Herbicides in Field Soils. R. J. Wagenet*, Cornell University, Ithaca, NY, and P. S. C. Rao, University of Florida, Gainesville (243).
- 2:30 Detoxification of Herbicide Residues in Soil. Patrick J. Shea*, University of Nebraska, Lincoln (244).
- 3:00 Discussion and Section Business Meeting
- 3:15 Adjourn

THURSDAY PM, FEBRUARY 9

SECTION VIII EQUIPMENT AND MACHINERY

Location: Flagler Ballroom

Section Chairman and Moderator: M. R. Gebhardt, USDA-ARS, University of Missouri, Columbia.

- 3:30 The Use of Soybean Oil as an Adjuvant. M. R. Gebhardt* and C. L. Webber, USDA-ARS, Columbia, MO, and L. F. Bouse, USDA-ARS, College Station, TX (137).
- 3:45 Overcoming Troublesome Weeds in Vegetable Crops with New Herbicide Application Techniques. H. M. Kempen, University of California, Bakersfield (138).
- 4:00 Woody Brush Control: Cost and Performance of a Herbicide Roller-Wiper. L. D. Gaultney*, H. G. Gibson, and H. A. Holt, Purdue University, West Lafayette, IN (139).
- 4:15 Field Testing a New Type of Selective Herbicide Applicator. E. J. Peters and R. A. McKelvey*, USDA-ARS, Columbia, MO (140).
- 4:30 A Multi-Boom Plot Sprayer for Efficient Application. B. E. Freed* and E. S. Oplinger, University of Wisconsin, Madison (141).
- 4:45 Discussion/Section Business Meeting

FRIDAY AM, FEBRUARY 10

SECTION I AGRONOMIC CROPS

Location: Tuttle Ballroom

Section Chairman: J. M. Chandler, Texas Agricultural Experiment Station, College Station.

Moderator: C. W. Derting, Monsanto Co., Memphis, TN.

- 8:00 Comparative Susceptibility of Common Bermudagrass [*Cynodon dactylon* (L.) Pers.] Biotypes to Several Herbicides. C. T. Bryson*, USDA-ARS, Southern Weed Science Laboratory, and G. C. Wills, Delta Branch, Mississippi Agricultural Forest Experiment Station, Stoneville (53).
- 8:15 Analysis of Atrazine Tolerant and Susceptible Common Lambsquarters (*Chenopodium album* L.) Biotypes. A. Westman* and R. D. Sweet, Cornell University, Ithaca, NY (54).
- 8:30 Variability in Corn Tolerance to Trifluralin Residues. F. C. Roggenbuck* and D. Penner, Michigan State University, East Lansing (55).
- 8:45 A Seven Day Growth Test for Detection of Genetic Sensitivity of Corn Genotypes to Common Corn Herbicides. N. L. Hartwig* and J. E. Zawierucha, Pennsylvania State University, University Park (56).
- 9:00 Phytotoxicity of Six Postemergence Herbicides to Three Rice (*Oryza sativa*) Biotypes. W. L. Barrentine, J. E. Street, and M. E. Kurtz*, Delta Branch, Mississippi Agricultural Forest Experiment Station, Stoneville (57).
- 9:15 Sorghum Response to Selected Rice Herbicides. E. F. Eastin*, Texas Agricultural Experiment Station, Beaumont (58).
- 9:45 Recess
- 10:00 Evaluation of Paclobutrazol and RSW 0411 in Rice. J. H. Jordan* and J. E. Street, Delta Branch, Mississippi Agricultural Forest Experiment Station, Stoneville (59).
- 10:15 Influence on Soybeans of Bioregulators in Combination with Postemergence Herbicides. D. J. Meier* and C. A. Stutte, University of Arkansas, Fayetteville (60).
- 10:30 Strategies for Rice Stand Establishment on Soils Having Metolachlor Residues. M. Braverman*, T. Lavy, and R. Talbert, University of Arkansas, Fayetteville (61).
- 10:45 Enhanced Biodegradation of EPTC Used for Johnson-grass [*Sorghum halepense* (L.) Pers.] Control. L. E. Bendixen*, Ohio State University, Columbus (62).
- 11:00 Discussion
- 11:15 Adjourn

FRIDAY AM, FEBRUARY 10

SECTION VII TEACHING AND EXTENSION

Location: Brickell Ballroom

Section Chairman and Moderator: C. L. Elmore, University of California, Davis.

- 8:00 F. L. Timmons, Pioneer Weed Scientist. L. W. Mitich, University of California, Davis (128).
- 8:15 Implications of Five Years of Weed Identification Efforts in Minnesota. O. E. Strand, University of Minnesota, St. Paul (129).
- 8:30 The Demonstration of Crop/Weed Relationships in a Weed Science Course. S. R. Radosevich, Oregon State University, Corvallis (130).
- 8:45 Weeds—1st Class Thieves. R. L. Chase, Utah State University, Logan (131).
- 9:00 Spray Check: A Computer Assisted Method for Determining Ground Spray Rig Accuracy. B. L. Bohmont, Colorado State University, Fort Collins (132).
- 9:15 Discussion/Section Business Meeting
- 9:30 Recess
- 9:45 California Pest Management Retrieval System. M. Stimmann, University of California, Davis.
- 10:00 A Computer Program for Herbicide Selection. A. R. Martin, University of Nebraska, Lincoln (133).
- 10:15 A Pilot Program for Scouting Weeds in Arkansas Soybeans. F. L. Baldwin* and C. M. Bonner, University of Arkansas, Little Rock (134).
- 10:30 Will I Die? or Poisonous Plants and People. M. D. McGlamery, University of Illinois, Urbana (135).
- 10:45 Pesticides: The Health and Environment Protectors. W. J. Weber, Indianapolis, IN (136).
- 11:00 Discussion/Adjourn

FRIDAY AM, FEBRUARY 10

SECTION IX ECOLOGY AND BIOLOGICAL CONTROL SYMPOSIUM

Microbiological Control of Weeds

Sponsored by the WSSA Biological Control of Weeds Committee

Location: Flagler Ballroom

Section Chairman: G. R. Loather, USDA-ARS, Frederick, MD.

Organizer and Moderator: P. C. Quimby, Jr., USDA-ARS, Stoneville, MS.

- 7:50 Introduction to the Symposium. P. C. Quimby, Jr.

SECTION X
PHYSIOLOGY

- 8:00 Progress on Classical Biological and Integrated Control of Rush Skeletonweed (*Chondrilla juncea* L.) in the Western U.S. Gary Lee*, University of Idaho, Moscow (176).
- 8:15 Evaluation of Rust Fungi as Biological Control Agents of Weedy *Centaurea* in North America. A. K. Watson, Macdonald College, McGill University, Ste-Anne-de-Bellevue, Quebec (177).
- 8:30 Evaluation of Exotic Rust Fungi for Classical Biological Control of Leafy Spurge (*Euphorbia esula-virgata*) and Other Noxious Weeds. W. L. Bruckart* and W. M. Dowler, USDA-ARS, Frederick, MD (178).
- 8:45 Biological Control of Northern Jointvetch in Rice and Soybeans—A Researcher's View. R. J. Smith, Jr., USDA-ARS, Stuttgart, AR (179).
- 9:00 Commercialization of 'College®'—An Industrialist's View. R. C. Bowers, The Upjohn Co., Kalamazoo, MI (180).
- 9:15 Biological Control of Stranglevine in Citrus—A Researcher's View. W. H. Ridings, Clemson University, Clemson, SC (181).
- 9:30 DEVINE®—The Way It Was Developed—An Industrialist's View. S. H. Woodhead and D. S. Kenney*, Abbott Laboratories, Long Grove, IL (182).
- 9:45 Recess

Moderator: K. P. Dorschner, USDA-CSRS, Washington, DC.

- 10:00 Nematode Control of Silverleaf Nightshade (*Solanum elaeagnifolium* Cav.) an APHIS Biological Control Pilot Project. P. E. Parker, USDA-APHIS, Mission, TX (183).
- 10:15 Mycoherbicide Research at the University of Arkansas—Past, Present and Future. G. E. Templeton, University of Arkansas, Fayetteville (184).
- 10:30 Integrated Control of Waterhyacinth [*Eichornia crassipes* (Mart) Solms] with a Pathogen, Insects, and Herbicides. R. Charudattan, University of Florida, Gainesville (185).
- 10:45 Microcomputer-Controlled Measurements of Pathogen Injury to Weeds. S. E. Lindow, University of California, Berkeley (186).
- 11:00 Patenting/Licensing of Microbiological Herbicides. R. Saliwanchik, Attorney at Law, Richland, MI (187).
- 11:15 The IR-4 Biorational Registration Program. R. T. Guest, Rutgers University, New Brunswick, NJ (188).
- 11:30 'Wrap-up'/Discussion. W. C. Shaw, USDA-NPS, Beltsville, MD.

Location: Jasmine

Section Chairman: R. D. Gruenhagen, Yardley, PA.

Section Moderator: R. E. Wilkinson, Georgia Station, Experiment.

- 8:00 Anatomical Variation Between Triazine-Susceptible and Resistant Common Groundsel (*Senecio vulgaris* L.) Biotypes. J. S. Holt, University of California, Riverside (224).
- 8:15 Structural and Physiological Comparisons of Triazine-Resistant and Susceptible Weed Biotypes. Kevin C. Vaughn* and Stephen O. Duke, Southern Weed Science Laboratory, Stoneville, MS (225).
- 8:30 Altered Photosynthetic Function in All Backcross Generations of Triazine-Resistant Rutabaga. A. Ali*, University of Guelph, Guelph, Ontario, E. P. Fuerst, Michigan State University, East Lansing, V. Souza Machado, University of Guelph, and C. J. Arntzen, Michigan State University (226).
- 8:45 Studies on the Mechanism of Paraquat Resistance in Horseweed (*Conyza linifolia*). E. P. Fuerst*, Michigan State University, East Lansing, A. D. Dodge, University of Bath, United Kingdom, H. Y. Nakatani, and C. J. Arntzen, Michigan State University (227).
- 9:00 Selectivity of Chlorsulfuron on Wheat and Barley. M. E. Foley, Montana State University, Bozeman (228).
- 9:15 Differential Dipropetryn Uptake and Translocation as a Selectivity Mechanism Among Cucurbit Species. Y. Demeter and B. Rubin*, Faculty of Agriculture, The Hebrew University of Jerusalem, Rehovot, Israel (229).
- 9:30 Recess
- 9:45 Leaf Wash Techniques for Estimation of Foliar Absorption of Herbicides. M. D. Devine, H. D. Bestman, J. C. Hall, and W. H. Vanden Born*, University of Alberta, Edmonton (230).
- 10:00 Surfactant Induced Alterations of Epicuticular Wax Structure. I. J. Kuzych* and W. F. Meggitt, Michigan State University, East Lansing (231).
- 10:15 Explanations for the Enhanced Efficacy of Bentazon Na-Salt by Oil. G. Retzlaff and W. McAvoy*, BASF Wyandotte Corporation, Parsippany, NJ (232).
- 10:30 Comparisons of Epicuticular Wax Structure and Chemical Composition from an Austrian and Several North American Biotypes of Leafy Spurge (*Euphorbia esula* L.). David G. Davis*, Gary D. Manners, and Rosa L. Stolzenberg, USDA-ARS, Fargo, ND, and Berkeley, CA (233).
- 10:45 An Investigation into the Resistance of Goosegrass (*Eleusine indica*) to Three Dinitroaniline Herbicides. J. P. Chernicky* and F. W. Slife, University of Illinois, Urbana (234).

- 11:00 Mutagenesis, Selection *In Vivo*, Rescue *In Vitro*, Recovers Norflurazon Resistance. L. M. Deal* and M. L. Christianson, Zoecon Corporation, Palo Alto, CA (235).
- 11:15 Reversal of the Inhibitory Action of Fluridone by Benzyladenine and Potassium in Greening Cucumber Cotyledons. R. A. Fletcher*, V. S. S. Meru, and S. N. Bhardwaj, University of Guelph, Ontario (236).
- 11:30 Discussion
- 11:45 Adjourn

FRIDAY AM, FEBRUARY 10

SECTION XI SOIL ASPECTS

Location: Monroe Ballroom

Chairman: R. E. Talbert, Department of Agronomy, University of Arkansas, Fayetteville.

Moderator: E. A. Woolson, USDA-ARS, Beltsville, MD.

- 8:00 Adsorption of Selective Grass Herbicides by Soil. S. K. Rick*, F. W. Sliife, and W. L. Banwart, University of Illinois, Urbana (245).
- 8:15 Structure-Adsorption Relation of Anilines on Soil. T. H. Dao, D. C. Bouchard*, and T. L. Lavy, USDA-ARS, and University of Arkansas, Fayetteville (246).
- 8:30 Soil Testing and Herbicide Rate Recommendations. H. J. Streck* and J. B. Weber, North Carolina State University, Raleigh (247).
- 8:45 Field Persistence of Norflurazon in Two Georgia Soils. J. Schroeder Kvien* and P. A. Banks, University of Georgia, Athens (248).
- 9:00 Effect of Soil Metabolites of Trifluralin on Cotton Growth. W. C. Koskinen*, USDA-ARS, Southern Weed Science Laboratory, Stoneville, MS, J. E. Oliver and P. C. Kearney, USDA-ARS, Pesticide Degradation Laboratory, Beltsville, MD (249).
- 9:15 Accelerated Breakdown of Butylate⁺ in Soils with a History of its Use. B. Menkveld* and J. H. Dekker, University of Guelph, Guelph, Ontario (250).
- 9:30 Factors Affecting Accelerated Microbial Degradation of EPTC + R-25788 and EPTC + R-25788 + R-33865. R. G. Harvey* and M. E. Kozak, University of Wisconsin, Madison (251).
- 9:45 Recess
- 10:00 Enhanced Biodegradation of Thiocarbamate Herbicides. H. D. Skipper*, E. C. Murdock, D. T. Gooden, and J. P. Zublena, Clemson University, Clemson, SC (252).
- 10:15 Enhanced Degradation of Diphenamid and Other Pesticides in Herbicide History Soils. J. Katan, University of Maryland, College Park, H. P. Wilson, Virginia Truck and Ornamental Research Station, Painter, and D. D. Kaufman*, USDA-ARS, Beltsville, MD (253).

- 10:30 The Degradation of MSMA and Speciation of its Residues in Soil. K. H. Akkari*, R. E. Frans, T. L. Lavy, and J. D. Mattice, University of Arkansas, Fayetteville (254).
- 10:45 Volatile and Particulate as Levels Above MSMA Treated Cotton Fields. E. A. Woolson*, R. D. Wauchope, and V. Pavanavasivam, USDA-ARS, Beltsville, MD, and Stoneville, MS (255).
- 11:00 Chlorsulfuron Movement in Soil. W. E. Dyer, P. K. Fay*, and D. K. Burkhart, Montana State University, Bozeman (256).
- 11:15 Bioactivity of Chlorsulfuron in Five Virginia Soils. W. Mersie* and C. L. Foy, Virginia Polytechnic Institute and State University, Blacksburg (257).
- 11:30 Section Business Meeting

FRIDAY AM, FEBRUARY 10

SECTION XIII INTERNATIONAL WEED SCIENCE

Location: Hibiscus A

Section Chairman and Moderator: R. E. Hoagland, USDA-ARS, Stoneville, MS.

- 8:00 Weed Control: The Small Farmer's Dilemma. J. L. Hamerton, Caribbean Agricultural Research and Development Institute, St. Lucia, West Indies (262).
- 8:15 Itchgrass (*Rottboellia exaltata* L.F.)—World Distribution, Biotypes, and Spread Within the United States. R. W. Millhollon, USDA-ARS, U.S. Sugarcane Field Laboratory, Houma, LA (263).
- 8:30 Weeds Reported to Occur in Rice in South and Southeast Asia—A Preliminary Assessment. K. Moody, International Rice Research Institute, Los Banos, Laguna, Philippines (264).
- 8:45 Atrazine Resistance Developed in Several Grass Weeds Following Repeated Application of Roadside in Israel. T. Yaacoby, Ministry of Agriculture, Tel-Aviv, M. Schonfeld, and B. Rubin*, Faculty of Agriculture, Hebrew University of Jerusalem, Rehovot, Israel (265).
- 9:00 Sugarcane Ratoon Renovation through Low Volume Application and Minimum Tillage in Brazil. J. E. Carvalho, Y. Kashiwakura, P. F. Burlamaqui, and R. A. Rogers*, Industrias Monsanto S.A., Sao Paulo, Brazil (266).
- 9:15 Herbicide Evaluation in Corn and Peanut Under Center Pivot Irrigation in Northeastern Venezuela. R. Q. Lacina* and G. A. McClish, Ball Corporation, Westminster, CO (266a).
- 9:30 Discussion/Section Business Meeting
- 9:45 Recess
- 10:00 Effect of Tillage and Herbicide on Cowpea Weed Control and Yield in the Subhumid Tropics. J. A. Poku*

and I. O. Akobundu, International Institute of Tropical Agriculture, Ibadan, Nigeria (267).

- 10:15 Selective Herbicides for Johnsongrass (*Sorghum halepense*) in Squash. M. Rojas-Garciduenas* and L. Villar-rue. Instituto Tecnológico y de Estudios Superiores de Monterrey, Mexico (268).
- 10:30 Control del Hojasén (*Florenxia cernua*) en el Pastizal Abierto. [Control of Tarbush (*Florenxia cernua*) in Open Pasture.] A. Coronado L.* and O. Cavazos C., Universidad Autónoma Agraria "Antonia Narro", Coahuila, Mexico (268a).
- 10:45 Chemical Weed Control in Bulb Onions in Ecuador. P. Westra, The Luke Society, Riobamba, Ecuador (269).
- 11:00 Postemergence Broadleaf Control with Lactofen in Soybeans in Brazil. B. L. Opic and J. Deli*, PPG Industries, Inc., Pittsburgh, PA (270).
- 11:15 Status of Soybean Weed Control, Research and Extension in Brazil, Uruguay and Argentina. T. T. Bauman, Purdue University, West Lafayette, IN (271).
- 11:30 An International Training Course on the Control of *Striga* in Cereal Crops. A. D. Worsham*, North Carolina State University, Raleigh, R. E. Eplee*, USDA-APHIS, Whiteville, NC, and M. A. Langston, USDA-APHIS, Dillon, SC (272).
- 11:45 Weed Science in the People's Republic of China. E. L. Knake, University of Illinois, Urbana (273).
- 12:00 Discussion
- 12:15 Adjourn

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R. P. Upchurch	1975
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R. D. Ilnicki	1976
D. E. Moreland	1976
E. L. Knake	1977
C. G. McWhorter	1977
H. A. Friesen	1977
Lawrence Southwick	1977
O. H. Fletchall	1978
J. L. Hilton	1978
H. M. LeBaron	1978
D. W. Staniforth	1978

*Society members being honored were originally referred to as Honorary Members. Beginning in 1970, the term was changed to WSSA Fellows, and the term Honorary Member has since been reserved for those being honored for meritorious service to the weed science discipline but not necessarily to WSSA without regard to WSSA membership.

H. P. Alley	1979
R. E. Frans	1979
K. C. Hamilton	1979
T. J. Sheets	1979
A. F. Wiese	1979
J. D. Bandeen	1980
S. N. Fertig	1980
C. L. Foy	1980
L. S. Jordan	1980
R. A. Peters	1980
C. R. Swanson	1981
W. A. Meggitt	1981
L. H. Hannah	1981
R. P. Romanowski	1981
J. F. Ahrens	1981
J. Antognini	1982
G. H. Bayer	1982
J. H. Dawson	1982
C. M. Switzer	1982
R. B. Taylorson	1982
R. N. Andersen	1983
W. D. Carpenter	1983
J. E. Gallagher	1983
D. L. Linscott	1983
L. W. Mitich	1983

WSSA ORIGINAL HONORARY MEMBERS*

A. S. Crafts	1964
K. P. Buchholtz	1964
F. L. Timmons	1964
C. J. Willard	1964
R. H. Beatty	1966
W. S. Ball	1967
W. B. Ennis, Jr.	1967
G. F. Warren	1968
E. P. Sylvester	1969

HONORARY MEMBERS*

Hans Gysin	1974
A. John Speziale	1975
Keith C. Barrons	1976
John D. Fryer	1978
Memashe Horowitz	1979
Virgil H. Freed	1980
Les J. Matthews	1981
G. D. Hill	1982
Shoouchi Matsunaka	1983

WSSA PAST PRESIDENTS

R. H. Beatty	1956
W. B. Ennis, Jr.	1957-58
A. S. Crafts	1959-60
K. C. Buchholtz	1960-61

W. C. Shaw	1962-63
G. F. Warren	1964-65
W. R. Furtick	1966
Richard Behrens	1967
B. E. Day	1968
G. C. Klingman	1969
L. L. Danielson	1970
D. L. Klingman	1971
R. P. Upchurch	1972
E. G. Rodgers	1973
E. L. Knake	1974
C. R. Swanson	1975
F. W. Slife	1976
C. L. Foy	1977
P. W. Santelmann	1978
J. R. Hay	1979
W. D. Carpenter	1980
D. E. Davis	1981
T. J. Sheets	1982

NOTES

NOTES

SUSTAINING MEMBERS

Weed Science Society of America

- Aceto Agricultural Corporation, Flushing, NY
Agri-Growth Research Inc., Hollandale, MN
Agway Inc., Chemical Division, Syracuse, NY
Alabama Farmers Coop, Decatur, AL
A & L Agricultural Laboratories, Memphis, TN
American Agricultural Services, Inc., Cary, NC
American Cyanamid Company, Princeton, NJ
American Hoechst Corporation, Somerville, NJ
Amoco Oil Company, Chicago, IL
The Andersons, Maumee, OH
Atchinson, Topeka and Santa Fe Railway, Albuquerque, NM
Balcom Chemicals, Inc., Greeley, CO
BASF Wyandotte Corporation, Parsippany, NJ
B.F.C. Chemicals, Inc., Wilmington, DE
R. H. Bogle Company, Alexandria, VA
Cenex, St. Paul, MN
Chevron Chemical Company, Ortho Division, Richmond, CA
Ciba-Geigy Corporation, Greensboro, NC
Deere and Company, Technical Center, Moline, IL
DeKalb Agriculture Research Inc., DeKalb, IL
Delavan Corporation, West Des Moines, IA
Delta Distributors, Inc., Hughs, AR
Diamond Shamrock Corporation, Cleveland, OH
Dow Chemical USA, Midland, MI
DuPont Biochemicals Department, Wilmington, DE
Ehrlich Chemical Company, Inc., Reading, PA
Electro General Corporation, Minnetonka, MN
Eli Lilly and Company, Greenfield, IN
Farm Press Publications, Clarksdale, MS
Farmland Industries, Kansas City, MO
FMC Corporation, Middleport, NY
Gandy Corporation, Owatonna, MN
Garst and Thomas Hybrid Corn, Coon Rapids, IA
W. R. Grace and Company, Memphis, TN
Great Western Sugar Company, Longmont, CO
Griffin Corporation, Valdosta, GA
Growmark, Inc., Bloomington, IL
Hopkins Agricultural Chemical Library, Madison, WI
ICI Americas, Inc., Goldsboro, NC
Indiana Farm Bureau Co-op Association, Inc., Indianapolis, IN
M & M Air Service, Beaumont, TX
3M Company, St. Paul, MN
Micron West, Inc., Houston, TX
Mobay Chemical Company, Kansas City, MO
Moble Company, Kilgore, TX
Monsanto Company, St. Louis, MO
Nalco Chemical Company, Oak Brook, IL
Nor-Am Agricultural Products, Inc., Naperville, IL
O. M. Scott and Sons Company, Maryville, OH
PBI Gordon Corporation, Kansas City, KS
Pennwalt Chemicals Corporation, Tacoma, WA
PPG Industries, Inc., Pittsburgh, PA
Puregro Company, Los Angeles, CA
Rhone Poulenc Inc., Monmouth Junction, NJ
Rohm and Haas Company, Philadelphia, PA

SUSTAINING MEMBERS
Weed Science Society of America
(Continued)

Sandoz, Inc., San Diego, CA
Shell Development Company, Modesto, CA
Stewart Agricultural Research Service, Inc., Macon, MO
Spraying Systems Company, Wheaton, IL
Stauffer Chemical Company, Mountain View, CA
Tex-Ag Company, Mission, TX
Thermo Kinetics Industries, Greenville, SC
Tide Products, Inc., Edinburg, TX
Union Carbide Ag Products Co., Research Triangle Park, NC
Uniroyal Chemical, Bethany, CT
The Upjohn Company, Kalamazoo, MI
Valley Chemical Company, Greenville, MS
Velsicol Chemical Corporation, Chicago, IL
Virginia Chemicals, Inc., Portsmouth, VA

1985 Meeting

February 5, 6, 7, 8
Seattle Sheraton Hotel
Seattle, Washington