

# NCWSS *News*

North Central Weed Science Society

Volume 16, Number 1, Spring 1999

## In This Issue

☼ <i>Program Taking Shape for 1999 Annual Meeting in Columbus, OH</i> .....	2
☼ <i>Resolutions of the NCWSS</i> .....	3
☼ <i>Distinguished Achievement Award Winners</i> .....	4
☼ <i>1998 NCWSS Fellows</i> .....	6
☼ <i>Highlights of the 1998 NCWSS General Session and Meeting</i> .....	8
☼ <i>The 1998 NCWSS Graduate Student Paper and Poster Contests</i> .....	10
☼ <i>North Central Weed Science Society 1999 Committee Appointments</i> .....	12
☼ <i>Call for Nominations</i> .....	15

*The NCWSS is on the web at:  
www.ncwss.iastate.edu*



North Central  
Weed Science Society

## From Your 1999 President—Phil Orwick

I want to thank the Society for the opportunity to serve as President for 1999. I look forward to the challenges of the year as the NCWSS heads to the new millennium. The discipline of weed science has certainly seen many changes in this century and will doubtless see many more past 2000. Change is almost always for the better and if we embrace it and accept it we can grow as a discipline and as a Society.

I hope all of you enjoyed the 53rd annual meeting as much as I did. The venue was superb and the weather cooperated nicely! Total attendance was down only slightly from 1997. There were a total of 183 oral presentations and 61 posters. The number of poster presentations has been increasing steadily over the past few years. We also had three symposia on the program this year - Professional Opportunities in Weed Science, Forensic Weed Science, and Herbicide Resistance. Thanks to Sara Allen, Dave Johnson, and Jamie Retzinger, respectively, for organizing and chairing these symposia. For the first time, CCA credits (CEUs) were given for attendance at the latter two symposia. Hopefully this can continue for future symposia. Our featured speaker, Dr. Harold Coble, IPM Coordinator for USDA-ARS, gave an excellent talk on Weed Science Beyond 2000 in keeping with our theme of Focus on the Future. Our thanks to Dr. Coble. We also continued the Member Forum as a part of the general session and from all accounts this was again a success.

The Local Arrangements Committee under the leadership of Duane Rathmann and Zach Fore did an outstanding job with the meeting facilities in St. Paul. Wasn't that ballroom a great venue for the posters and the banquet?! Thanks also to the organizers of the graduate student contests for their hard work and especially to Curtis Thompson, Chair of the Resident Education Committee, who put it all together. I also want to thank Tom Hoverstad and Dave Simpson of the Local Arrangements Committee for handling the logistics of the poster session.

As a result of Board elections, the following are new officers of the Society for 1999: Duane Rathmann is the new Vice President; Bryan Young is the new Editor of the Research Report; and Kent Harrison is the new WSSA Representative. Thanks to Bill Miller who has completed the cycle from Vice President to Past President; Mike Barrett for his years of great service on the Research Report; and Gordon Harvey for his tenure as WSSA Representative.

The committee assignments for 1999 are included in this newsletter. My thanks to all those committee chairs that served the Society in 1998. The committee structure of our



*Continued on page 2*

## Program Taking Shape for 1999 Annual Meeting in Columbus, OH

Plans are well underway for the 1999 NCWSS Annual Meeting in Columbus, OH. The theme of the meeting will be "Weed Science in Transition". The general session will include keynote speakers who will address the impacts of new technologies on weed science in the public and private sectors. We are also planning three exciting symposia which relate to the theme of the meeting.

The symposia topics are: 1) Forensic Weed Science, chaired by Dave Johnson; 2) Biology and Management of Weed Seed Banks, chaired by Frank Forcella; and 3) Impacts of Biotechnology on Weed Science, chaired by Tom Peters. The Program Committee looks forward to your participation in the meeting with a volunteered paper or poster. See you in Columbus!

JIM KELLS  
1999 PROGRAM CHAIR

### From the Editor

The deadlines for submitting items for the next two NCWSS Newsletters are May 15 and September 1. Preferred method of news item submission is by e-mail (michael.j.horak@monsanto.com). Otherwise, contact:

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### President continued from page 1

Society is the backbone that keeps things running smoothly and gets things done. For 1999, there are several changes that have occurred regarding committee structure. First, we combined the Extension Special Interest Group and the North Central Regional Publications Committee into the Extension Standing Committee. Next, we renamed the Computer Committee as the Electronic Communications Committee to better reflect the changing ways in which we communicate with one another. Finally, the annual meeting did not include a section on Equipment and Application Methods since only one paper was submitted. I have included this section on the 1999 list but I encourage the Chair of the section to solicit papers and members to present papers for this section for the 1999 meeting.

I was quite pleased with the submissions for papers and posters for the 1998 annual meeting. All but three of the presentations were received by the Program Chair via e-mail. Thanks to Doug Buhler for getting this submission method started in 1997. Your new Program Chair for 1999, Jim Kells, and I have discussed ways to make the submission procedure even better and more efficient. I'm sure you'll support Jim's efforts as he readies the 1999 program.

Speaking of Jim Kells, thanks are due him for the new logo that you see adorning this newsletter. Jim and his graphics arts colleagues at Michigan State designed this excellent logo that will serve

the Society well as we head into the next millennium. (I'm almost positive that it's a robust white foxtail seeding!)

Inside the Beltway, we have a new Washington Liaison for NCWSS, WSSA, and the other regional societies. Rob Hedberg has accepted this position and will also assume the duties of Director of Science Policy for WSSA. Rob has most recently been Business Manager for Agway in Vermont. Some of you may remember Rob as an AAAS Congressional Fellow with the Senate Agricultural Committee in 1995-1996.

We belong to a strong and vibrant Society. However, we cannot remain as such without the volunteerism of our members. If you are active in NCWSS, please stay that way! If you aren't currently active, please consider participating in some way. Remember, we're always looking for ways to make the Society better serve its members. Please don't hesitate to let one of the officers know if you have a concern or a better idea.

I hope your 1999 is a good one and I look forward to seeing you this December 14-16 at the Hyatt Regency Hotel in Columbus, OH for the 54th annual meeting of the NCWSS.

(By the way, I've had several inquiries about the whereabouts of The Chair. No need to worry. It's safe and sound here in Carmel, IN. It needs a little TLC and some new lettering but I think there's a good chance that an up-to-date Chair, complete with jimsonweed capsule, will make an appearance at the banquet in Columbus.)

## Resolutions of the NCWSS

**RESOLUTION ON:** Local Arrangement Committee for the 53rd Annual Meeting.

WHEREAS the North Central Weed Science Society relies upon the effort and diligence of the Local Arrangements Committee for arranging suitable facilities for the annual meeting; and

WHEREAS a well-organized Local Arrangements Committee is crucial to the conduct of a successful annual meeting; and

WHEREAS Chairpersons Zack Fore and Duane Rathmann and the other members of the Local Arrangements Committee have fulfilled all their responsibilities in an exemplary manner;

THEREFORE BE IT RESOLVED that the North Central Weed Science Society in session at St. Paul, MN, December 7 - 10, 1998 for the 53rd Annual Meeting commends Zack Fore and Duane Rathmann and the Local Arrangements Committee for their outstanding efforts in providing the Society with the excellent meeting facilities and arrangements.

**RESOLUTION ON:** The North Central Collegiate Weed Science Contest.

WHEREAS the North Central Collegiate Weed Science Contest requires adequate facilities in order to conduct the contest in an orderly and educational manner; and

WHEREAS the facilities at the Valent Midwest Research Center in Champaign, IL provided an excellent contest environment; and

WHEREAS the Summer Contest Host and staff of the Valent Research Center in Champaign, IL met the needs of the Society and had the dedication for a successful North Central Collegiate Weed Science Contest;

THEREFORE BE IT RESOLVED that the North Central Weed Science Society in session at St. Paul, MN, December 7 - 10, 1998 for the 53rd Annual Meeting commends Ronald Jones and the staff of the Valent Midwest Research Center for their outstanding efforts and hard work in providing the Society with an excellent facility and a well run and educational Weed Science Contest.

**RESOLUTION ON:** Graduate Student Paper and Poster Contest Judges for the 53rd Annual Meeting.

WHEREAS the North Central Weed Science Society relies on the voluntary contribution of time, effort and expertise of its member selected to judge the Graduate Student Paper and Poster Contests; and

WHEREAS the judges selected for the Graduate Student Paper and Poster Contest for the 53rd Annual Meeting fulfilled their obligations and responsibilities with dedication and commitment;

THEREFORE BE IT RESOLVED that the North Central Weed Science Society in session at St. Paul, MN, December 7 - 10, 1998 for the 53rd Annual Meeting commends the judges of the Graduate Student Paper and Poster Contest for their inputs of time, effort, and cooperation in providing the Society with will run, successful contests at this Annual Meeting.

**RESOLUTION ON:** The Hotel Meeting Facilities for the 53rd Annual Meeting of the North Central Weed Science Society.

WHEREAS the North Central Weed Science requires adequate facilities and lodging in order to conduct the business and program of the Society at the annual meeting; and

WHEREAS the meeting rooms and facilities of the Radisson Hotel of St. Paul, MN provided an excellent and spacious meeting environment; and

WHEREAS the staff and management of the Radisson Hotel of St. Paul, MN were helpful and cooperative in fulfilling the needs of the Society for a successful annual meeting;

THEREFORE BE IT RESOLVED that the North Central Weed Science Society in session at St. Paul, MN, December 7 - 10, 1998 for the 53rd Annual Meeting commends the Radisson Hotel, its staff and management for their outstanding efforts in providing the Society with excellent meeting facilities and arrangements.

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## Distinguished Achievement Award Winners

### Research - Ronald F. Krausz

Mr. Krausz is a native of East St. Louis, Illinois. He obtained his B.S. and M.S. degrees from the University of Illinois. Ron has been employed as a researcher in the Department of Plant, Soil and General Agriculture at Southern Illinois University at Carbondale since 1984. He has conducted weed research studies to evaluate weed control in different tillage systems, application methods and transgenic crops. He was one of the first researchers to publish on control of annual weeds with glyphosate at several rates and spray volumes prior to widespread adoption of glyphosate resistant soybean.

Ron continues to be creative and innovative in designing research to solve potential problems growers may encounter in the future. In addition to weed research, he has published fertility and tillage research conducted over a 20 year period in the *Agronomy Journal*. Ron's fertility and tillage research is among the longest consecutive tillage studies in the United States.

Through the years, Ron has organized and conducted special field days on specific topics annually for special interest groups at the Belleville Research Center.



These groups include Midwest growers, students from the local high schools and junior college and visitors from South America, Russia, Germany, England, China and Japan. He has helped in teaching field research techniques to Japanese scientists and graduate students.

Ron has authored numerous articles on weed science and has published 16 refereed manuscripts since 1992. His ideas on future research directions are solicited by a wide range of clientele from other universities, industry and the general agricultural community.

In addition to the North Central Weed Science Society, Ron is an active member in the Weed Science Society of America and the American Society of Agronomy. He has served on numerous society committees and is currently a member of the North Central Weed Science Society Board of Directors, representing the state of Illinois.

### Service - James R. Martin

Dr. Martin obtained his B.S. and M.S. degrees from The Ohio State University and his Ph.D. degree from the University of Kentucky. He began his professional career as an extension educator in 1978. As an Extension Weed Specialist, Jim became involved in a variety of different programming efforts and works with several different cropping systems. He has been instrumental in developing and introducing weed management techniques for no-till crop production within the southern areas of the north central region. Jim conducts applied research and has developed educational materials for specific problem weeds such as johnsongrass, wild garlic and Italian ryegrass associated with these crop production systems. He promotes weed control practices that insure long-term success with no-till crop production.

Jim has authored or coauthored a variety of Extension publications, newsletters, fact sheets and other publications to address weed management issues.

He coauthors a comprehensive weed control guide for Kentucky that is revised annually. He has served on numerous committees and chaired several committees in the regional weed science societies. In 1997, he started a second term as a member of the North Central Weed Science Society Board of Directors representing the state of Kentucky. In addition to the North Central Weed Science Society, Jim is an active member in the Southern Weed Science Society, the Weed Science Society of America, the International Weed Science Society and the Council of Agricultural Science and Technology. He also serves on the Advisory Boards for the Kentucky Fertilizer and Agrichemical Association and the Vegetation Management Association of Kentucky.

Jim serves as Pesticide Coordinator for the University of Kentucky College of Agriculture. The position serves as a liaison with the Kentucky Department of Agriculture on Pesticide registrations within the state.

In 1998, he received the MD Whiteker Excellence in Extension Award. This award is presented in Kentucky to the outstanding Extension Specialist who has demonstrated excellence in service and educational programming. It recognizes



the recipients achievements, participation and leadership roles at the state, regional and national level.

### **Industry - Randy W. Lloyd**

Dr. Lloyd is a Senior Technical Service Representative for American Cyanamid. He grew up on a farm in the high plains of Texas and was involved in the day to day management of dryland and irrigated cropping systems. Randy received his B.S., M.S. and Ph.D. degrees from Texas Tech University in entomology, crop physiology and weed science, respectively. He has been involved with various aspects of the plant protection industry, including herbicide discovery, biopesticide research and development and field technical service. Currently, Randy is a Senior Technical Service Representative in eastern Kansas. Frequently, Randy promotes agriculture and weed science through public relations and educational activities. He speaks to 400-500 school children each year to promote "Fun on the Farm" to help children understand

the importance of agriculture.

Randy is very active in the North Central Weed Science Society, serving as Chairperson of the Graduate Student Paper and Poster Contest and as Vice Chairperson of the Resident Education Committee. In addition to the North Central Weed Science Society, Randy is an active member in several other professional societies including the Weed

Science Society of America, the Northeast Weed Science Society, Southern Weed Science Society, Entomological Society of America, Southwest Branch of Entomological Society of America, North Central Entomological Society, Kansas Association of Independent Crop Consultants, Kansas Fertilizer and Chemical Association and the Kansas Forage and Grasslands Council. He serves on the Board of Directors for the Kansas Forage and Grasslands Council and is Chairperson of the Membership Committee. He also serves on the Public Education Committee and the Legislative Committee for the Kansas Fertilizer and Chemical Association.

Randy is a regular guest lecturer in the weed science classes at Kansas State University, speaking on pesticide safety and the agricultural chemical industry. Through the years, he has authored or coauthored numerous papers on weed science. Randy is the recipient of American Cyanamid's Creative Excellence Award, CTC Gold Miner Trainer Award and Outstanding Performance in Legislative Communications Award.



### **Duane Rathmann Elected as Vice President**

Duane has been a member of the NCWSS since completing his weed science graduate work at North Dakota State University in 1980. He has presented many papers at NCWSS meetings, served on several committees, and most recently served as co-chairman of local arrangements for the recent meeting held in St. Paul.

He worked in the Field Research and Development group for Rohm and Haas company from 1980 to 1989 based in Ames, IA. Since 1989, he has worked for American Cyanamid as the Pursuit technical specialist in Princeton, NJ, and presently in the field development group at Waseca, MN.



**NCWSS 1999 Officers:** Front Row (l to r) Chris Boerboom, Secretary-Treasurer; Jim Kells, President Elect; Phil Orwick, President; Duane Rathmann, Vice President; Doug Bubler, Past President; Back Row (l to r) Tom Peters, CAST representative; Kent Harrison, WSSA representative; Merrill Ross, Proceedings editor; Michael Horak, Newsletter editor; Bob Schmidt, Executive Secretary; Not present Carole Lembi, Proceedings editor.

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## New Washington Liaison Named

Rob Hedberg was appointed as Director of Science Policy for the Weed Science Society of America in February and will return to Washington where he previously worked on the U.S. Senate Agriculture Committee as a Congressional Science Fellow from 1995 to 1996. This fellowship was sponsored cooperatively by nine national and regional societies specializing in weed science, crop science and soil science. Between 1996 and 1999 Mr. Hedberg was Agronomic Business Manager for the North Country Enterprise of Agway, Inc., a leading regional farm input cooperative. Prior to his fellowship Mr. Hedberg had also worked for Agway as Manager of Crop Protection Research and Applied Technology. In addition Mr. Hedberg has nearly ten years experience working closely with producers as a regional Agronomy Agent for the University of Vermont Extension Service and as owner of a consulting practice which specialized in crop management recommendations, field research and assessment of new production technologies.

Mr. Hedberg's educational experience includes a Bachelor's degree in Crop and Soil Science from Michigan State University, a Master's degree in Plant Science from the University of New Hampshire and a Certificate of Special Studies in Administration and Management from Harvard University.

## 1998 NCWSS Fellows

### **JAMES P. WORTHINGTON**

James P. Worthington was born January 6, 1935 in Conover, Ohio. He received his B.S. in Animal Science in 1956 from Ohio State University; M.S. in Agronomy with emphasis in forages in 1957 from Ohio State University; and his Ph.D. in Weed Science in 1971 from Ohio State University.

Jim's career started, after completing his M.S. from Ohio State University, by being employed in various aspects of the farm retail business in Western Ohio. He first worked as a salesperson for marketing pesticides and fertilizers. He later moved up to management of an elevator, feed mill, and seed processing plant. Ten years after completing his M.S. he returned to Ohio State University to start work on his Ph.D. in Weed Science. During this period he worked as a teaching associate in the Department of Agronomy. His previous work experience allowed him to have the unique ability to take textbook principles and apply them to real world issues. Upon graduating from Ohio State University he took an Assistant Professor position at Western Kentucky University. For the next 26 years Jim played a major role in making Western Kentucky University a well respected school for students in agriculture, before retiring on June 30, 1997. During this time Dr. Worthington held many titles including Associate Professor, Professor, and twice was Acting Department Head.

Dr. Worthington taught at least 11 different courses that covered a variety of subject matter including weed science, crop production, turfgrass management, statistics, and experimental design. He averaged teaching four courses each fall and spring semester. In spite of operating on a very limited budget, Jim was able to direct nine graduate students to the M.S. level. Since Western Kentucky University does not support a Ph.D. program, several of his former students have pursued advanced degrees elsewhere. Jim essentially started the weed science field program at Western Kentucky University, with very limited support provided by the University. The focus of his field research was weed management with emphasis on johnsongrass control in agronomic crops. By 1975 the agricultural pesticide industry recognized Jim's capability to conduct weed science research and began funding his program.

Dr. Worthington's contributions to teaching have been recognized at many levels. In 1982 he received the prestigious Faculty Excellence Award from the Ogden College of Science and Technology and Health at Western Kentucky University. The Agricultural Student Council at Western Kentucky University distinguished him with the Outstanding Professor Award in Agriculture in 1991. The fact that the North Central Weed Science Society awarded Jim the Distinguished Achievement Award in Education in 1992 shows that many of our weed science colleagues outside of Kentucky have an appreciation of Jim's dedication to education.

Jim has developed an active leadership role in the North Central Weed Science Society since joining in 1970. He chaired nine committees, served on the Board of Directors on numerous occasions, and was President in 1989. Dr. Worthington was instrumental in providing leadership that changed the name of our organization from North Central Weed



Control Conference to North Central Weed Science Society. Jim played an important role in initiating the Distinguished Achievement Awards and was the first member to chair the committee.

### **PAUL J. OGG**

Paul J. Ogg was born August 9, 1945 in Worland, Wyoming. He received his B.S. in Plant Science from the University of Wyoming in 1968, and M.S. in Weed Science from the University of Wyoming in 1970.

Paul's professional positions have all been with American Cyanamid from 1970 to the present. His initial position was to establish a research farm, and to conduct discovery research screenings of herbicides, insecticides, and plant growth regulators in Fresno, California. Paul was the first Field Research Scientist to screen Prowl herbicide, in the field.

Mr. Ogg next accepted a Field Agriculturist position in Monticello, IL. in 1973, with responsibilities for research and development in the states of Indiana, Illinois, and Missouri. During this time he worked on the development and registration of Counter insecticide, for use in-furrow and banded in sweet and field corn for the control of various insect pests. Research also continued to develop and register Prowl for use in field corn and soybeans.

Paul was promoted in 1976 to Regional Manager Research and Development and transferred to Longmont, CO. Paul's responsibilities included coordinating field research programs in the states of Texas, New Mexico, Oklahoma, Kansas, Nebraska, Colorado, and Wyoming. Five to six agriculturists reported to him during this time.

Mr. Ogg accepted his current position of Senior Field Research and Development Agriculturist for Colorado, Wyoming, western Nebraska and Kansas in 1985. His research activities have led to the success of Arsenal herbicide for industrial weed control, Assert herbicide for wild oat

control in cereals, Pursuit herbicide for use in soybeans, conservation reserve acreages, chemical fallow, drybeans, alfalfa, and imidazolinone resistant corn. Paul continues to evaluate promising new leads such as imazamox use on alfalfa, drybeans, and resistant wheat.

Mr. Ogg is a dedicated and enthusiastic researcher who is highly respected by his industry and academic peers. His



common sense approach to research coupled with his ability to effectively communicate the meaningfulness of his results are keys to his success. Paul has

made it a point to speak to classes at Colorado State University and the University of Wyoming regarding career opportunities with industry, future trends in pest management, and herbicide resistant weed management. Mr. Ogg single handedly developed the Western Society of Weed Science student educational enhancement program which allows graduate students the opportunity to spend up to 10 days in other areas of the country broadening their depth and understanding of agriculture.

Mr. Ogg has been an active member of several weed science societies including the North Central Weed Science Society. His contributions to NCWSS includes membership on various committees, and chairmanship of several of these committees. Paul has been very active in the Western Society of Weed Science, having served in several capacities including President in 1991, and Secretary in 1986. He was honored as Fellow and Outstanding Weed Scientist of the WSWS in 1993, and 1995 respectively. Paul has also chaired and served on several committees of the Weed Science Society of America, as well as being the WSWS Representative on the WSSA Executive Board.

## **Necrology Report**

Kenneth Ward Bradfield of Evansville, IN passed away on September 10, 1998. Kenneth was in the army for four years during WW II, he remained in the reserves for 27 years and retired as a lieutenant colonel. Kenneth had a BS degree in Agricultural Education from Purdue University. He worked as an Assistant County Agricultural Agent for four years and as a sales and management trainee at Sears before spending 27 years with Hahn, Inc., manufacturer of the high clearance sprayer Hi-Boy. While employed by Hahn, Inc., Kenneth started as a salesman and held many managerial positions during

his service with the company. Kenneth was associated with several professional groups including the North Central Weed Science Society, the National Fertilizer Solutions Association, and the Farm and Industrial Equipment Institute. As a member of the NCWSS, Kenneth was on the Board of Directors, served as Vice President and President, and was selected as an honorary member in 1980. He is survived by his wife of 56 years, June Bradfield, daughter Patricia Bradfield, son Kenneth F. Bradfield, a sister Kanova Wines, four grandchildren, and a great-granddaughter.

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## Highlights of the 1998 NCWSS General Session and Meeting

The 53rd meeting of the North Central Weed Science Society was held in St. Paul, Minnesota at the Radisson Hotel on December 7-10, 1998. The theme of the program was "Focus on the Future".

Approximately 650 weed scientists from the North Central Region and other areas of the world attended the meeting.

Dr. Phil Larsen, Interim Dean of Food, Environmental, and Agricultural Science at the University of Minnesota welcomed the attendee's to St. Paul. He emphasized the importance of agriculture in Minnesota and the changes that have taken place.

The keynote speaker was Dr. Harold D. Coble, IPM Coordinator, USDA, Washington, DC. His presentation was entitled "Weed Science Beyond 2000-A Look at the Future". He indicated that the current focus is on chemical based programs and cultural management inputs with growth taking place in remedial options and transgenic crops. He indicated that in the future we will need to define strategic approaches to weed management and acquire more tools with more integration

of technology. The importance of diversifying tactics to preserve tools for the future was stressed. He also highlighted various issues such as Food Quality, Water Quality, Biotechnology, and IPM Mandates.

In the presidential address Dr. Doug Buhler ARS-USDA, Ames, Iowa reviewed the past year's activities thanking the various committees and others for their

hard work and dedication. He encouraged members to continue to work together to preserve and improve weed science in the future.

The general session concluded with a forum for members to ask questions and discuss issues with the Society officers and committee chairs.

Submitted by: Dr. Kip W. Sander, Novartis Crop Protection.



*Keynote speaker Harold Coble addresses the general session.*



*Dr. Phil Larsen, interim dean, University of Minnesota welcomes the NCWSS*



*Phil Orwick, current president, thanks Doug Buhler past president for his service to the Society.*



*Randy Lloyd presents graduate student awards at the banquet.*



*Awards presentation at the banquet.*



*Attendees discuss research in the poster session.*



*Jeff Gonsolus MC presides over the banquet*



*Attendees exchange scientific information between sessions.*

## The 1998 NCWSS Graduate Student Paper and Poster Contests

The paper and poster competitions provide valuable experience to graduate students in presenting research results. The contests are part of every North Central Meeting. The presentations consistently set high standards for presentations that we use to communicate the results of our research efforts. We acknowledge all the

participants of the student contest. We also thank more than 40 contest judges for their time, effort and insight in ranking the presentations.

There were 53 papers and 29 posters in this year's NCWSS Graduate Contest. The awards consisted of a certificate and a check, \$50 for second place and \$100 for first place.



**First place paper contest winners:** Douglas Kieffer, Chad Kalaber, Darren Unland, Tony White, and Nate Kemp



**Second place paper contest:** Jess Spotanski, Marc Hoobler, Jayla Allen, Curtis Bensch, and Jason Maschoff

## 1998 Graduate Student Poster Winners

### Corn and Sorghum

**1st Place:** *Effects of Weed Competition Duration on Soil Moisture, Plant Nitrogen Level, and Yield in Roundup-Ready Corn.* Chad Kalaher\*, Stephen Hart, Fred E. Below and Ed W. Stoller. University of Illinois, Urbana, IL.

**2nd Place:** *Influence of Weed Removal Timing on Corn Yield.* Jess J. Spotanski\*, Alex Martin, Fred Roeth and John L. Lindquist. University of Nebraska, Lincoln, NE.

### Weed Ecology and Biology

**1st Place:** *Density and Growth Stage Effects on Giant Foxtail Soil-Water Use.* Doug Kieffer\*, F. W. Simmons and C. W. Boast. University of Illinois, Urbana, IL.

**2nd Place:** *Light Interception of Palmer Amaranth in Soybean.* Curtis Bensch\*, Michael J. Horak and Stephen M. Welch. Kansas State University, Manhattan, KS.

### Soybeans and Annual Legumes

**1st Place:** *Weed Control with Imazamox and Diphenylether Herbicides in Soybean.* Darren Unland\*, Kassim Al-Khatib and Dallas Peterson. Kansas State University, Manhattan, KS.

**2nd Place:** *Management of ALS-Resistant Common Sunflower in Soybean.* Jayla Allen\*, William G. Johnson, Jimmy D. Wait and Cheryl S. Holman. University of Missouri, Columbia, MO.

### Herbicide Physiology

**1st Place:** *Common Sunflower (*Helianthus annuus*) Resistance to Acetolactate Synthase Inhibiting Herbicides* Anthony White\*, Michael D. K. Owen, Robert G. Hartzler and John Cardina. Iowa State University, Ames, IA and Ohio

Agricultural Research and Development Center, Wooster, OH.

**2nd Place:** *Effect of Ammonium Sulfate on Glufosinate Absorption and Translocation in Various Weed Species*. Jason Maschhoff\* and Stephen E. Hart, University of Illinois, Urbana, IL.

### **Sugarbeets, Ornamentals, Soil and Environmental Aspects**

**1st Place:** *Competitiveness of Annual Weeds in Glyphosate and Glufosinate-Resistant Sugarbeet (*Beta vulgaris*)*. Nathan Kemp\* and Karen Renner, Michigan State University, East Lansing, MI.

**2nd Place:** *Effects of Application Timing on Atrazine Runoff Losses*. Marc Hoobler\*, David Regehr, and Philip L. Barnes, Kansas State University, Manhattan, KS.

## 1998 Graduate Student Poster Winners

### **Soybean and Annual Legumes**

**1st Place:** *Weed Management with Reduced Rates of Glyphosate in Glyphosate-Tolerant Soybean*. Jimmy D. Wait\*, William G. Johnson and Cheryl S. Holman, University of Missouri, Columbia, MO.

**2nd Place:** *Effect of Late Season Herbicide Application in Soybeans (*Glycine max*) on Woolly Cupgrass (*Eriochloa villosa*) Seed Production and Viability*. Barry K. Nelson\*, Kevin W. Adam and Michael D. K. Owen, Iowa State University, Ames, IA.

### **Weed Ecology**

**1st Place:** *Emergence Patterns of Annual Weeds in Relation to Temperature and Moisture*. Lowell D. Sandell\*, Douglas D. Buhler and Robert G. Hatzler, Iowa State University, Ames and USDA-ARS National Soil Tilth Laboratory, Ames, IA.

**2nd Place - Tie:** *Emergence Characteristics of Woolly Cupgrass*. James A. Mickelson\* and R. Gordon Harvey, University of Wisconsin, Madison, WI.

**2nd Place - Tie:** *Evidence for Hybridization and Introgression of Herbicide Resistance Between Two Species of *Amaranthus**. Denise K. Wetzel\*, Michael J. Horak, Daniel Z. Skinner and Peter A. Kulakow, Kansas State University, Manhattan, KS.

### **Corn and Sorghum**

**1st Place:** *Influence of Light Duration and Intensity on Glufosinate Activity*. Jason T. Beyers\* and Reid J. Smeda, University of Missouri, Columbia, MO.

**2nd Place:** *Application Dynamics of Four Types of Drift-Reducing Nozzles*. Brad K. Ramsdale\* and Calvin G. Messersmith, North Dakota State University, Fargo, ND.



**Poster contest:** Front row: Jim Wait, 1st place; Denise Wetzel, 2nd place; and Lowell Sandell, 1st place; Back row: Brad Ramsdale, 2nd place; Jason Beyers, 1st place; Barry Nelson, 2nd place; and James Mickelson, 2nd place

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# North Central Weed Science Society 1999 Committee Appointments

## A. Standing Committees

### 1. Board of Directors

Philip L. Orwick, President (317 848-2818)  
James J. Kells, President-Elect (517 355-2173)  
Duane P. Rathmann, Vice President  
(507 835-2580)  
Chris Boerboom, Secretary-Treasurer  
(608 262-1392)  
Merrill A. Ross and Carole A. Lembi, Editors,  
Proceedings (765 494-4621)  
Michael J. Horak, Editor, Newsletter  
(785 532-7240)  
Bryan G. Young, Editor, Research Report  
(618 453-2496)  
Kent Harrison, WSSA Representative  
(614 292-8468)  
Thomas J. Peters, CAST Representative  
(314 694-2647)  
Doug Buhler, Past President (515 294-5502)  
Robert A. Schmidt, Executive Secretary  
(217 352-4212)

### Directors

Alberta - Linda Hall (403 427-7098) (1999)  
Colorado - Jeffery Coultas (2000)  
Illinois - Ron Krausz (618 566-4761) (1999)  
Indiana - Michael Hickman (765 494-4448) (2000)  
Iowa - James E. Retzinger (515 226-0152) (1999)  
Kansas - John Fenderson (316 825-4379) (2001)  
Kentucky - James Martin (502 365-7541) (2000)  
Manitoba - Open  
Michigan - John Kaufmann (517 349-7084) (2001)  
Minnesota - Carlyle Holen (218 281-8691) (1999)  
Missouri - Gerald Gogan (816 459-6018) (2000)  
Nebraska - Duane Ebke (402 332-5528) (2001)  
North Dakota - Terry Gregoire (701 662-7080)  
(1999)  
Ohio - Paul Sprankle (614 794-0096) (2001)  
Oklahoma - Aithel McMahon (405 223-3505)  
(2000)  
Ontario - Michael Reidy (519 271-1847) (1999)  
South Dakota - David Vos (605 688-5100) (2000)  
Wisconsin - Richard Proost (608 262-7743) (2001)  
Wyoming - Stephen Miller (307 766-3112) (1999)

### Directors at Large

Extension - Aaron Hager  
Graduate Students - Krishona Bjork  
Industry - Brent Peterson  
Regulatory and Crop Consultants - Jon Baldock  
Research and Publications - Michele Obermeier  
Resident Education - Randy Lloyd

### 2. Constitution and Operating Procedures Committee

William Lueschen, Chair (612 625-6719)  
John M. Fenderson, Vice Chair (1999)  
Blake Brown (1999)  
Gary Kilgore (1999)  
Robert Schmidt, Ex Officio  
Chris Boerboom, Ex Officio

### 3. Finance, Steering, and Policy Committee

Chris Boerboom, Chair (608 262-1392)  
LeRoy Cobia (1999)  
Jim Kells (2000)  
Phil Stahlman (2001)  
Rick Iverson (2001)  
Robert Schmidt, Ex Officio

### 4. NCWSS Fellow Committee

Brent Peterson, Chair (507 684-2029)  
Alan Dexter, Vice Chair  
Ken Carlson, Past Chair  
Emile Regnier (1999)  
Tom Bauman (2000)  
Gary Fellows (2000)  
Ted Warfield (2000)  
Bill Witt (2001)  
Steve Miller (2001)

### 5. Legislative Information Committee

Duane Rathmann, Chair (507 835-2580)  
LeRoy Cobia, Past Chair  
James Retzinger  
George Czapar  
Bernard Zanstra  
Don Null  
Duane Ebke  
Chris Hall  
Washington Liaison, Ex Officio

### 6. Local Arrangements Committee

1999 - Columbus, OH  
Hyatt Regency Columbus  
Mark Loux, Chair (614 292-7162)  
Kent Harrison  
Anthony Dobbels  
Paul Sprankle  
Brian Manley  
Diane Kinter  
Greg Steckel  
Jim Kells, Ex Officio

### 7. Career Placement Committee

Bob Hartzler, Chair (515 294-1923)  
Steve Valenti, Vice Chair  
Bob Masters, Past Chair  
J.D. Green (1999)  
Richard Proost (2000)  
Mark Dahmer (2000)  
Steve Valenti (2000)  
Sara Allen (2001)  
Henry McLean (2001)

### 8. Membership Committee

Gary Fellows, Chair (319 377-2900)  
Sharon Clay, Past Chair  
Bryce Nelson (2000)  
Ken Carlson (2001)  
Patrick Geier (2001)

### 9. Nominating Committee

Ed Stoller, Chair (217 333-9654)  
Dave Johnson, Vice Chair  
Roger Becker, Past Chair  
Steve Busse (2000)  
Jerry Doll (2000)  
Loyd Wax (2000)  
Charles Slack (2001)

### 10. Extension Committee

Aaron Hager, Chair (217 333-4424)  
Ron Krauz, Vice Chair  
Karen Renner, Past Chair  
Diane Kintner (1999)  
Jeff Gunsolus (1999)  
Michael Hickman (1999)  
Richard Zollinger (2000)  
Bill Johnson (2001)  
Alex Martin (2001)  
Chris Boerboom (2001)  
Micheal Owen, (2001)

### 11. Program Committee

Jim Kells, President-Elect and Chair  
(517 355-2173)  
Mark Loux, Local Arrangements  
Duane Rathmann, Vice President  
Chris Boerboom, Secretary/Treasurer  
Aaron Hager, Extension  
Krishona Bjork, Graduate Students  
Brent Peterson, Industry  
Jon Baldock, Regulatory and Crop Consultants  
Michele Obermeier, Research and Publications  
Randy Lloyd, Resident Education  
Phil Orwick, Ex Officio.

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## **12. Publicity and Public Relations Committee**

Duane Rathmann, Vice President, Co-Chair (507 835-2580)

Mark Loux, Local Arrangements, Co-Chair (614 292-7162)

Jim Kells, Past Chair

## **13. Resolutions and Necrology Committee**

Gail Wicks, Chair (308 532-3611)

Richard Proost, Vice Chair

Kevin Thorsness, Past Chair

## **14. Distinguished Achievement Award Committee**

Doug Buhler, Chair (515 294-5502)

Phil Orwick, Vice Chair

Bill Miller, Past Chair

Don Penner

Tom Jordan

LeRoy Cobia

Steve Weller

Paul Sprankle

Phil Stahlman

Jeff Gunsolus

Micheal Owen

## **B. NCWSS Special Interest Groups**

### **1. Industry**

Brent Peterson, Chair (507 684-2029)

David Nicolai, Vice Chair

Vince Ulstad, Past Chair

### **2. Regulatory and Crop Consultants**

Jon Baldock, Chair (608 845-7993)

Sue Bellman, Vice Chair

Steve Wagner, Past Chair

### **3. Research and Publications**

Michele Obermeier, Chair

Julie Young, Vice Chair

Anthony Dobbels, Past Chair

### **4. Resident Education**

Randy Lloyd, Chair (913 242-6188)

Reid Smeda, First Vice Chair

Dave Johnson, Second Vice Chair

Curtis Thompson, Past Chair

## **5. Graduate Students**

Krishona Bjork, Chair (715 425-3345)

Chad Lee, First Vice Chair

Erin Chadbourne, Second Vice Chair

Brad Ramsdale, Past Chair

## **C. Sectional Program Chairs**

### **1. General Program**

Jim Kells, Chair (517 355-2173;

kells@pilot.msu.edu)

### **2. Poster Session**

Rick Bottoms, Chair (660 446-3724)

Patrick Tranel, Vice Chair

Rene Scoresby, Past Chair

Damian Franzenburg

### **3. Corn and Sorghum**

Duane Rathmann, Chair (507 835-2580)

Shane Taylor, Vice Chair

### **4. Cereals and Oilseeds**

Jeremy Frie, Chair (701 281-3959)

Patrick Geier, Vice Chair

### **5. Forage and Range**

Walter Fick, Chair (785 532-7223)

Gary Kilgore, Vice Chair

### **6. Industrial, Forestry, Turf, and Aquatics**

Jerry Doll, Chair (608 263-7437)

Arv Glaser, Vice Chair

### **7. Equipment and Application Methods**

John Fenderson, Chair (316 825-4379)

### **8. Soybeans and Annual Legumes**

Joseph Bruce, Chair (217 897-6699)

Peter Porpiglia, Vice Chair

### **9. Herbicides Physiology**

Tracy Klingaman, Chair (815 498-1057)

Mark Dahmer, Vice Chair

### **10. Weed Ecology and Biology**

John Lindquist, Chair (402 472-2771)

Stevan Knezevic, Vice Chair

### **11. Soil and Environmental Aspects**

Jennifer Simmons, Chair (217 333-8632)

Michael Hickman, Vice Chair

### **12. Alternate Communication Systems**

Alan Haack, Chair (515 267-8161)

## **13. Sugarbeets, Horticulture, and Ornamentals**

Bob Wilson, Chair (308 632-1263)

Doug Doohan, Vice Chair

## **D. Special Committees**

### **1. Collegiate Weed Science Contest Local Arrangements**

Jim Ladlie, Chair (507 889-4371)

Ronnie Jones, Past Chair (217 687-7100)

### **2. Electronic Communications Committee**

Brent Pringnitz, Chair (515 294-9487)

Wayne Olson, Past Chair

Jack Dekker

Michael DeFelice

Frank Forcella

Michael Horak

Jim Lux

### **3. Long Range Planning and Organizational Affairs**

Bill Miller, Chair (816 373-0012)

Doug Buhler

Dallas Peterson

Mark Dahmer

Nelson Balke

### **4. Herbicide Resistance Committee**

Mark Peterson, Chair

Richard Zollinger, Vice Chair

Monte Anderson

Steve Valenti

Gary Aagesen

Nelson Balke

James Bloomberg

Reid Smeda

Don McCall

Jamie Retzinger

Bob Hartzler

### **5. Future Site Selection**

Charles Slack, Co-Chair (606 257-3168)

Doug Buhler, Co-Chair (515 294-5502)

Loyd Wax, Past Chair

James Bloomberg

Edward Stoller

Tom Peters

Jerry Doll

Mark Loux

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# Determining the Practice of Integrated Pest Management (IPM)

## A Working Definition for the Year 2000 Goal

**Editors note:** *During his remarks to the General Session at the NCWSS meeting, Harold Coble discussed a working definition for Integrated Pest Management as related to the year 2000 IPM goal. Many members asked that this definition be included in the newsletter.*

Harold Coble

A key in the determination of whether the Administration's goal of 75 percent of U.S. cropland acres under IPM by the year 2000 has been reached is some rational definition of what growers must do in order to be considered as IPM practitioners. Adoption of IPM systems normally occurs along a continuum from largely reliant on prophylactic control measures and pesticides to multiple-strategy biologically intensive approaches, and is not usually an "either/or" situation. It is important to note that the practice of IPM is site-specific in nature, and individual tactics are determined by the particular crop/pest/environment scenario. Where appropriate, each site should have in place a management strategy for Prevention, Avoidance, Monitoring, and Suppression of pest populations (the PAMS approach). In order to qualify as IPM practitioners, growers should be utilizing tactics in three or more of the PAMS components.

Prevention is the practice of keeping a pest population from infesting a crop or field, and should be the first line of defense. It includes such tactics as using pest-free seeds and transplants, preventing weeds from reproducing, irrigation scheduling to avoid situations conducive to disease development, cleaning tillage and harvesting equipment between fields or operations, using field sanitation procedures, and eliminating alternate hosts or sites for insect pests and disease organisms.

Avoidance may be practiced when pest populations exist in a field or site but the impact of the pest on the crop can be avoided through some cultural practice. Examples of avoidance tactics include crop rotation such that the crop of choice is not a host for the pest, choosing cultivars with genetic resistance to pests, using trap crops or pheromone traps, choosing cultivars with maturity dates that may allow harvest before pest populations develop, fertilization programs to promote rapid crop development, and simply not planting certain areas of fields where pest populations are likely to cause crop failure. Some tactics for prevention and avoidance strategies may overlap in most systems.

Monitoring and proper identification of pests through surveys or scouting programs, including trapping, weather monitoring and soil testing where appropriate, should be performed as the basis for any suppression activities. Records should be kept of pest incidence and distribution for each field. Such records form the basis for crop rotation selection, economic thresholds, and suppressive actions.

Suppression of pest populations may become necessary to avoid economic loss if prevention and avoidance tactics are not successful. Suppressive tactics may include cultural practices such as narrow row spacings or optimized in-row plant populations, alternative tillage approaches such as no-till or strip-till systems, cover crops or mulches, or using crops with allelopathic potential in the rotation.

Physical suppression tactics may include cultivation or mowing for weed

control, baited or pheromone traps for certain insects, and temperature management or exclusion devices for insect and disease management.

Biological controls, including mating disruption for insects, should be considered as alternatives to conventional pesticides, especially where long-term control of an especially troublesome pest species can be obtained. Where naturally-occurring biological controls exist, effort should be made to conserve these valuable tools.

Chemical pesticides are important in IPM programs, and some use will remain necessary. However, pesticides should be applied as a last resort in suppression systems using the following sound management approach:

- (1) The cost:benefit should be confirmed prior to use (using economic thresholds where available);
  - (2) Pesticides should be selected based on least negative effects on environment and human health in addition to efficacy and economics;
  - (3) Where economically and technically feasible, precision agriculture or other appropriate new technology should be utilized to limit pesticide use to areas where pests actually exist or are reasonably expected;
  - (4) Sprayers or other application devices should be calibrated prior to use and occasionally during the use season;
  - (5) Chemicals with the same mode of action should not be used continuously on the same field in order to avoid resistance development; and
  - (6) Vegetative buffers should be used around stream banks to minimize chemical movement to surface water.
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## Agri-Growth Welcomes the 1999 North Central Collegiate Weed Science Contest

### **VOLUNTEER OR REGISTER NOW!**

Located in rural south central Minnesota, Agri-Growth, Inc., is pleased to once again sponsor the 1999 North Central Collegiate Weed Science Contest. This year's event will be held on Thursday, July 22, at Agri-Growth's research facility near Hollandale, MN. The contest will include weed identification, sprayer calibration, unknown herbicide identification, and problem solving.

For additional details and registration information contact Michelle Trihus at Agri-Growth, Inc., @ 507-889-4371 or email [mtrihus@agrigrowth.com](mailto:mtrihus@agrigrowth.com). Anyone interested in volunteering to help with the contest should contact Michelle as well.

Agri-Growth is proud to be a four-time sponsor of the NCWSS contest.

*See the NCWSS web page: [www.ncwss.iastate.edu](http://www.ncwss.iastate.edu) for complete contest materials.*

## First Call For Nominations 1999 Distinguished Achievement Awards

It's not too early to nominate your outstanding colleagues in the following award categories:

- Education
- Industry
- Professional Staff
- Research
- Service
- Young Scientist

The North Central Weed Science Society seeks to recognize the outstanding contributions of its members through the Distinguished Achievement Awards, but we need your help. The most deserving candidates will not receive awards if they are not nominated.

Complete details on the nominating process and eligibility of nominees and nominators will be published in the 1998 NCWSS Proceedings. The deadline for submission of all nomination materials to the committee chair will be September 10, 1999.

As chair of the committee, I am willing to apply one of the guiding principles of my life. That is, rules are made to be bent, sometimes severely. The point is, if you feel that the rules are constricting your ability to secure a worthy nominee, contact me and we can try to work it out. The goal is to get deserving people nominated.

Please direct questions and requests for nomination forms and instructions the Distinguished Achievement Award Chair, Doug Buhler, USDA-ARS National Soil Tilth Laboratory, 2150 Pammel Drive, Ames, IA 50011. E-mail [buhler@nsl.gov](mailto:buhler@nsl.gov), phone 515 294-5502, and fax 515 294-8125.

## Call for Nominations for NCWSS Fellows

Contact Brent Peterson by **June 1st** indicating your intention to nominate someone as a Fellow or to suggest a nominee.

Selection as a Fellow is the highest honor the society bestows on its members and is limited to 0.5 percent of the membership annually.

The Fellow Committee is responsible for identifying those individuals most deserving of this recognition. To assist with this task, members of the Society are encouraged to submit nominations for NCWSS Fellows or to suggest possible nominees for this award to the Chairman of the Fellow Committee, Brent Peterson.

The deadline for submitting nominations and supporting letters for this year is September 19, 1999. Directions for submission of nominations can be found in the Proceedings of the NCWSS. Eight copies of the nomination should be submitted to: Brent Peterson, 8113 S.W. 158th St. Ellendale, MN 56026; (507) 684-2029.

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## Position Announcement

### University of Illinois at Urbana-Champaign— Department of Crop Sciences

**Assistant Professor of Weed Physiology.** Weed Physiologist position in the Department of Crop Sciences with emphasis on research and teaching of physiological, biochemical and molecular principles of weed science. This is a 9-month tenure track position with opportunity for summer appointment. Responsibilities will be 70 percent research and 30 percent teaching.

The incumbent will develop a successful, extramurally-funded, laboratory-based research program directed to solution of weed management problems of the major agronomic crops grown in Illinois. The research will emphasize fundamental physiology and biochemistry of weed science; utilization of contemporary molecular techniques is expected. Research areas may include, but are not limited to, herbicide action, herbicide metabolism, and weed biology.

Teaching duties will include a weed science undergraduate/graduate course every year and a graduate weed science course in alternate years. The teaching assignment will involve some team teaching. The incumbent will also advise graduate and undergraduate students, and direct graduate student research. The successful candidate is expected to collaborate and interact effectively with appropriate faculty and staff within and outside the department and College of ACES in the conduct of research and teaching activities, and actively cooperate with industry and University of Illinois personnel in field research programs.

A Ph.D. in weed science, plant physiology, agronomy or a related discipline is required. Postdoctoral experience desired. The candidate must possess excellent interpersonal and communication skills; demonstrate ability to conduct independent research, and clear ability and desire to excel in classroom teaching. Salary commensurate with training and experience. Starting date is August 21, 1999 or when a suitable candidate is available. For full consideration, applications will be accepted until April 30, 1999.

Interested persons should assemble an application packet consisting of an introductory cover letter, a curriculum vitae, and a statement of teaching and research goals. The packet should be sent to: Professor G. H. Heichel, Head, Department of Crop Sciences, University of Illinois at Urbana-Champaign, 1102 South Goodwin Avenue, Urbana, Illinois 61801. Telephone (217) 333-9480. Applicants must also arrange to have a full set of certified university transcripts and three letters of reference sent to the same address, all to arrive on or before the closing date. For additional information contact: Dr. Edward W. Stoller, Search Committee Chair, ; Department of Crop Sciences, University of Illinois at Urbana-Champaign, 1102 South Goodwin Avenue, Urbana, Illinois; 61801. Telephone: (217) 333-9654, FAX: (217) 333-5299, email: estoller@uiuc.edu.

THE UNIVERSITY OF ILLINOIS IS AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER. PLEASE CITE ANNOUNCEMENT NUMBER 01/99B-6425 WHEN APPLYING.

## Position announcement

### Hybrid Corn Production Research Manager

Location: Waterloo, NE (Omaha Area)  
Position Announced: January 1999  
Goal of Position: Decrease costs of corn seed production and maximize yield while maintaining or improving quality. Improve dissemination and use of production research information. Qualifications: PhD / MS in Agronomy with a Crop Production related emphasis preferred (i.e. Plant Breeding, Seed Science or Crop Science). Experience in hybrid corn seed production and plant breeding valuable. Field research experience required. Field plot design and statistical analysis skills required. Managerial experience preferred. Good oral and written communications skills. Self-motivated, along with a sincere desire to make a valuable contribution to agriculture. Computer skills in spreadsheet, statistics, graphing and word processing. Duties: Manage the Production Research department at The J.C. Robinson Seed Company. Plan and conduct production research experiments to maximize seed yields, improve seed quality, and increase purity. Conduct and coordinate parent tests in cooperation with plant breeders. Coordinate communication between plant breeding, agronomy, foundation seed, and production departments. Interpret and disseminate production research (including herbicides, insecticides, populations, etc.) to Golden Harvest seed corn growers, production agronomists, and field supervisors. Analyze historical yield and other information to develop recommendations for placement and management of each inbred. Conduct agronomy production training meetings for growers, agronomists, and field supervisors. Direct inquiries to: Jim Emanuel, Recruiting Coordinator or Bob Sabata, Agronomy Research Manager Golden Harvest / The J.C. Robinson Seed Co. (800) 228-9906 jobs@jcrob.com or bsabata@jcrob.com For additional company information, www.goldenharvestseeds.com