

THE NIOSH AGRICULTURAL CENTERS AND RESEARCH ON AGRICULTURAL RESPIRATORY DISEASES

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Abstract

The National Institute for Occupational Safety and Health (NIOSH), Centers for Agricultural Disease and Injury Research, Education, and Prevention were established as part of a Centers for Disease Control and Prevention (CDC) / NIOSH agricultural health and safety initiative begun in 1990. The Centers were established by cooperative agreement to conduct research, education, and prevention projects to address the nation's agricultural health and safety problems. Eight Agricultural Centers have been established in different geographic regions. Collectively, these Centers address many agricultural health and safety problems including respiratory disease. This presentation describes the NIOSH Agricultural Centers Program and ongoing efforts aimed at respiratory health problems in agriculture.

Introduction

Agriculture consistently ranks as one of the most hazardous industries in the United States. Acute traumatic injury and death are among the most significant and striking occupational hazards in agriculture. There were approximately 22 deaths per 100,000 workers in the agricultural sector [Agriculture, forestry, and fishing] during 1995. The average annual fatality rate for the United States civilian working population for this same time period was 5 deaths per 100,000 workers.⁽¹⁾ Of special concern are the Children (over 100) killed each year while involved in farm activities.⁽²⁾ During 1993, approximately 201,000 work related lost-time injuries occurred on U. S. farms, nearly 10 injuries for every 100 farms.⁽³⁾ Those who work in agriculture are also at increased risk for occupational morbidity from musculoskeletal disorders, certain cancers, reproductive disorders, dermatological conditions, zoonotic diseases, hearing loss, stress related mental disorders, and occupational lung diseases.⁽⁴⁻⁸⁾

NIOSH, one of the Centers for Disease Control and Prevention (CDC), has the responsibility to protect and promote the health and safety of the nation's workforce. The operating mandate for NIOSH, as described in the Occupational Safety and Health Act, is "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources." With the recognition of a need for improvement

in the safety and health of agricultural workers, the Congress of the United States established a national initiative in agricultural safety and health in 1990 (Public Law 101-517). In this initiative, Congress appropriated funds to NIOSH to establish a national program in agricultural health and safety. The NIOSH Agricultural Centers were one of the extramural programs created through this NIOSH agricultural health and safety initiative. To ensure that preventive actions and interventions are based on scientific findings, and to better understand the etiology of diseases and injuries, NIOSH funded the Centers for Agricultural Disease and Injury Research, Education, and Prevention as a part on this national program. These Centers were established at university or university-affiliated medical centers where research, training and prevention efforts could be undertaken.

The NIOSH commitment to agricultural health and safety is reflected in the growth of this agricultural initiative and initiative programs including the NIOSH Agricultural Centers. The NIOSH Program in agricultural health and safety includes over 31 extramural projects and 42 intramural research projects (Please See Program Handout).⁽⁹⁾ Additionally, NIOSH recently created a full time position to coordinate agricultural health and safety throughout the Institute. Dr. Stephen Olenchock was just selected to fill this position; he will report directly to NIOSH Director, Dr. Linda Rosenstock, on matters concerning agricultural health and safety. The growth in the NIOSH agricultural program is seen in a new (1997) NIOSH Childhood Agricultural Injury Initiative. This initiative includes the creation of a new National Children's Center for Rural and Agricultural Health and Safety. The growth of NIOSH's program in agricultural health and safety is also seen in the creation of new agricultural health and safety intervention projects, intramural research projects, and extramural grants / cooperative agreement projects aimed at preventing disease and injury in agriculture.⁽⁹⁾

NIOSH Agricultural Centers Program

The NIOSH Agricultural Centers program represents a major NIOSH effort to protect the health and safety of agricultural workers and their families. This extra-and intra-mural program brings external partners, from Agricultural Centers and other institutes, together with NIOSH investigators in a collaborative effort to prevent occupational disease and injury among agricultural workers and their families. Since 1990, eight Agricultural Centers have been established by cooperative agreement. The Agricultural Centers program has grown from two Agricultural Centers initially funded in 1990 to eight Centers as shown in the figure below. These Agricultural Centers have been established in eight different Department of Health and Human Services (DHHS) Regions to be responsive to the agricultural health and safety issues unique to agriculture in different geographic settings.

NIOSH AGRICULTURAL CENTERS By State and Regional Boundaries

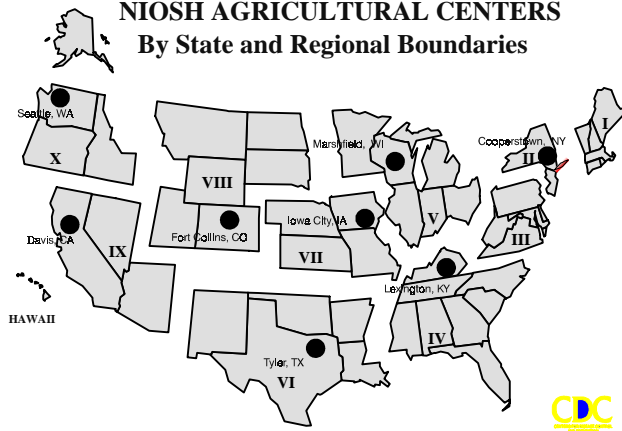


Table 1 provides detail on the location of each of the Agricultural Centers, as well as information on the center directors, and the geographic region served by each Center. Currently, the eight NIOSH Agricultural Centers are established to provide national as well as regional coverage and service.

The program objectives for the NIOSH Agricultural Centers includes research, education, and prevention components as described below:

- Develop and conduct research related to the prevention of occupational disease and injury of agricultural workers and their families.
- Develop and implement model educational outreach, and intervention programs promoting agricultural health and safety for agricultural workers and their families.
- Develop and evaluate control technologies to prevent illness and injuries among agricultural workers and their families.
- Develop and implement model programs for the prevention of illness and injury among agricultural workers and their families.
- Evaluate agricultural injury and disease prevention and educational materials and programs implemented by the Center.
- Provide consultation and/or training to researchers, health and safety professionals, graduate /professional students, and agricultural extension agents and others in a position to improve the health and safety of agricultural workers.
- Develop linkages and communication with other governmental and non-governmental bodies involved in agricultural health and safety with special emphasis on communications with other CDC/NIOSH sponsored agricultural health and safety programs.

The NIOSH Agricultural Centers Program is in a second cooperative agreement program cycle. To assist program direction and improvement for this cycle, NIOSH sponsored an evaluation of all extramural agricultural projects including the Agricultural Centers. This review was completed by an external review panel in 1995.⁽¹⁰⁾ The review panel concluded that the NIOSH Agricultural Centers “comprise a strong and productive scientific effort towards prevention of injury and illness in agriculture. The Centers have achieved admirable progress toward this end, considering the short amount of time since the initiative began.” In addition to the recommendation for continuation of the Agricultural Centers Project, the review panel recommended an expansion of the program to include other regions with a high degree of agricultural activity not served under the current Agricultural Centers program. This external review panel provided other specific recommendations for the Agricultural Centers Program and these recommendations were incorporated into the NIOSH Agricultural Centers Program for the second, competitive program cycle which began in the Fall of 1996.

Research on Agricultural Respiratory Diseases through the NIOSH Agricultural Centers

Respiratory disease is a significant occupational health problem for those working in agriculture and many of the NIOSH Agricultural Centers have projects involving respiratory disease / disease prevention in agriculture. Table 2 provides a list of those projects by Agricultural Center. Collectively, the Agricultural Centers are active in many projects involving a variety of respiratory health issues in agriculture. Included among these are projects involving 1) Assessment of risk, incidence, and prevalence measures for respiratory disease in rural cohorts 2) Evaluation of children’s respiratory exposures in agriculture, 3) Studies of crystalline silica exposure and pulmonary fibrosis 4) Evaluation of respiratory exposure controls, 5) Study of molecular biomarkers of pulmonary inflammation related to agricultural exposures, 6) Respiratory symptoms related to work in the seafood processing industry, 7) Occupational asthma in farmers, 8) Respiratory exposures related to fatality risks from livestock manure storage facilities, and other projects as presented in Table 2. Some of these projects address respiratory disease and exposure assessment related to organic dusts or dust constituents such as endotoxins. Assessing exposures to mineral dusts / crystalline silica and the potential for pulmonary fibrosis in agricultural settings is a research focus at some of the Agricultural Centers. Some of the respiratory projects ongoing through the Agricultural Centers involve the development, use, and evaluation of control technologies to prevent respiratory disease.

In addition to these research projects, the NIOSH Agricultural Centers provide a direct service to prevent respiratory injury and disease through education / training courses, information and publications, and through occupational safety and health consultation. In this way,

each of the eight NIOSH Agricultural Centers serve a resource for their region and nationally in the prevention of respiratory disease in agriculture.

Conclusions

The creation of the NIOSH Agricultural Centers provided a unique resource to help address the significant occupational safety and health problems seen in agriculture. The Centers have provided resources and expertise to address a diverse set of health and safety problems in agriculture as well as the infrastructure to be responsive to regional issues. Research is an important component of the Agricultural Centers Program, and the Centers have been very productive. In 1997, a special bibliography was published to present the research products completed by the Agricultural Centers.⁽¹¹⁾ The bibliography is a credit to the Agricultural Centers and reflects their high level of productivity.

The Agricultural Centers have demonstrated the ability to work together collaboratively, with agricultural workers, with NIOSH and other health and safety organizations, and with industry, to address some of the most pressing health and safety problems in agriculture. An example would be the collective efforts to prevent fatalities related to the farm tractor and tractor overturns. The NIOSH Agricultural Centers have been at the front of national efforts to prevent tractor related fatalities through many combined activities including developing training programs and documents, surveillance, testing Roll-Over Protective Structures (ROPS) for industrial manufacturers, developing new ROPS technologies, sponsoring a national conference on tractor fatalities, providing farmers with guidance and parts catalogs to assist in ROPS retrofits for older tractors, and others.

The NIOSH Agricultural Centers also provide the resource and expertise to help address specific health or safety problems in agriculture such as respiratory exposures and disease, as presented in this manuscript. Collectively the Agricultural Centers have many ongoing projects and activities to address and aid in the prevention of respiratory health problems in agriculture including those unique to regional settings.

References

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Table 1. NIOSH Agricultural Centers.

Agricultural Center	Region ¹	Center Director
University of California Agricultural Health and Safety Center Telephone: (916) 752-4050	IX	Marc B. Schenker, M.D., M.P.H. Old Davis Road University of California Davis, CA 95616-8757
High Plains Intermountain Center for Agricultural Health and Safety Telephone: (970) 491-6152	VIII	Roy M. Buchan, Dr. P.H. 133 Environmental Health Building Colorado State University Fort Collins, CO 80523-1681
Great Plains Center for Agricultural Health Telephone: (319) 335-4212	VII	Stephen Reynolds, PhD 100 Oakdale Campus, #124 The University of Iowa Iowa City, IA 52242-5000
Southeast Center for Agricultural Health and Injury Prevention Telephone: (606) 323-6836	IV	Robert McKnight, M.P.H., Sc.D. University of Kentucky Department of Preventive Medicine Lexington, KY 40536
Northeast Center for Agricultural and Occupational Health (NEC) Telephone: (607) 547-6023	I to III	John J. May, M.D. New York Center for Agricultural Medicine and Health One Atwell Road Cooperstown, NY 13326
Southwest Center for Agricultural Health, Injury, and Education Telephone: (903) 877-5896	VI	Arthur Frank, M.D., Ph.D. University of Texas Health Center at Tyler P.O. Box 2003 Tyler, TX 75710
Pacific Northwest Agricultural Safety and Health Center Telephone: (206) 543-0916	X	Richard A. Fenske, Ph.D., MPH Department of Environmental Health University of Washington Seattle, WA 98195-7234
Midwest Center for Agricultural Research, Education and Disease and Injury Prevention Telephone: (715) 387-9298	V	Paul D. Gunderson, Ph.D. National Farm Medicine Center 1000 North Oak Avenue Marshfield, WI 54449-5790

¹Department of Health and Human Services (DHHS) region served.

Table 2. Respiratory Projects by Agricultural Center

**CALIFORNIA
(REGION IX)**



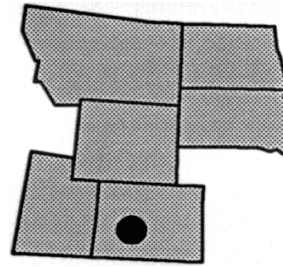
University of California Agricultural Health and Safety Center

Old Davis Road
University of California
Davis, CA 95616-8757

RESPIRATORY PROJECTS:

- Incident Injury and Disease Among a Cohort of California Farmers and Farm Operators.
- Determinants of Respiratory Disease Among California Farmers and Farm Operators.
- Pulmonary Fibrosis and Mineral Content of Lung Tissues From Deceased California Farm Workers.
- Agricultural Farm Workers Dust and Endotoxin: Level, Dose, Respiratory Effects and Respiratory Protection Evaluation: A Longitudinal Interdisciplinary Study.

**COLORADO
(REGION VIII)**



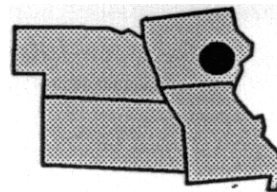
High Plains Intermountain Center for Agricultural Health and Safety

133 Environmental Health Bldg.
Colorado State University
Fort Collins, CO 80523-1681

RESPIRATORY PROJECTS:

- Molecular Biomarkers of Grain Dust Exposures.
- Silica and Respiratory Organic Dust Exposures of Potato Harvest and Processing.
- Acute Respiratory Effects and Endotoxin Exposures During Wheat Harvest.

**IOWA
(REGION VII)**



Great Plains Center for Agricultural Health

100 Oakdale Campus, #124
The University of Iowa
Iowa City, IA 52242-5000

RESPIRATORY PROJECTS:

INDUSTRIAL HYGIENE CORE

- Field Evaluation of Respiratory Protection for Ammonia in Agricultural Environments.
- Evaluation of In-field Anhydrous Ammonia Applications.
- Evaluation of Occupational Exposures at Composting Facilities.
- Oil Mist Generation as a Dust Reduction Method in Swine Confinement Facilities.
- Design of Tractor Cabs to Reduce Exposure to Dusts and Pesticides.

TOXICOLOGY CORE

- Causative Agents of Organic Dust-Induced Lung Inflammation.
- Molecular Biology Methods for Bioaerosol Exposure Assessment.
- Inhalation Toxicology Models for Agricultural Dust-Induced Pulmonary Disease.

THE KEOKUK COUNTY RURAL HEALTH STUDY

- Prevalence and Incidence of Respiratory Disease and Dysfunction in a Rural Cohort.
- Case Control Studies of Respiratory Disease in a Rural Cohort.
- Risk Factors and Determinants of Respiratory Disease in a Rural Cohort.
- Genetic Determinants of Organic Dust Induced Airway Disease.
- Indoor Air Quality in Rural Residences.
- Evaluation of Children's Agricultural Exposures.
- House Dust Mites and Barn / Storage Mites in Rural Iowa.

**NEW YORK
(REGIONS I to III)**



Northeast Center for Agricultural and Occupational Health (NEC)
New York Ctr. for Agricultural
Medicine and Health
One Atwell Road
Cooperstown, NY 13326

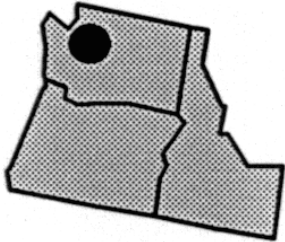
RESPIRATORY PROJECTS:

- Outcomes of Occupational Asthma in Farmers.
- Tunnel Ventilation in Poultry Confinement.

**WASHINGTON
(REGION X)**



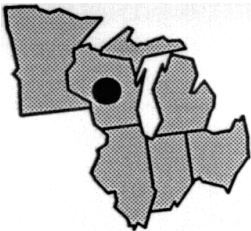
Pacific Northwest Agricultural Safety and Health Center
Dept. of Environmental Health
Box 357234
University of Washington
Seattle, WA 98195-7234



RESPIRATORY PROJECTS:

- Respiratory Health in the Seafood Processing Industry.

**WISCONSIN
(REGION V)**



Midwest Center for Agricultural Research, Education and Disease and Injury Prevention
National Farm Medicine Center
1000 North Oak Avenue
Marshfield, WI 54449-5790

RESPIRATORY PROJECTS:

- Reducing Fatality Risks From Livestock Manure Storage Facilities.