Guest Columns

Robert Hosford and Don Priebe are retiring from the faculty of the College of Agriculture and Agricultural Experiment Station.

In farewell, each has been invited to express his thoughts in a guest editorial.

Robert M. Hosford, Jr.
Plant Pathology

In surveys beginning 23 years ago I discovered that tan spot of wheat leaves causes repeated yield losses in hard red spring, winter and durum wheats throughout North Dakota. Septoria leaf spots, spot blotch, three bacterial leaf spots and other diseases cause more erratic damage. To establish that these repeated losses occur required years of cooperative field research, with the branch research centers doing most of the labor and absorbing most of the cost and chemical companies donating fungicide.

As my students and I studied the biology and control of wheat leaf spot and other diseases we were helped with statistics and computers first by Dr. R.H. Busch and then by Dr. J.J. Hammond and the entire group at the North Dakota State University (NDSU) Computer Center. Without this support and assistance from secretaries, technicians, engineers, extension specialists, buildings and grounds professionals, and librarians, the work would have been greatly restricted or impossible.

This discovery that tan spot is a major disease of wheat stimulated world-wide research on the disease. Cooperative efforts led to the finding of increasingly higher levels of resistance to tan spot among the world wheats, in alien germplasm such as that introduced into wheat by Dr. Leonard Joppa, and in other Triticum species from Dr. S.S. Maan. It stimulated research by Dr. R.A.A. Morrall and his students revealing that tan spot is a major disease of native prairie grasses in Canada and resulting in findings by Dr. J.M. Krupinsky at Mandan and ourselves that tan spot occurs on many North Dakota grasses.

As a I dug deeper into the leaf spot complex, I found that varietal resistance to tan spot is of a new type, inversely related to duration of post infection foliage wetness. I discovered four new fungal diseases of wheat, all eliciting resistance of the new type. Since no individual wheat variety had resistance to two or more of these diseases, resistance was variety and fungus specific. Mr. W.C. Luz, M.S. candidate, and I found varying levels of aggressiveness among isolates of the tan spot fungus from all over the Great Plains of North America. Later, while a Ph.D. candidate at Cornell University with Dr. G.C. Bergstrom, Mr. Luz found that tan spot is temperative sensitive. Mr. C.R. Larez, Ph.D. candidate, Dr. Tom Freeman, Dr. Hammond and I determined that this moisture-related genotype resistance to tan spot occurs on the molecular level.

It appears among the mesophyll and epidermal cells of the wheat leaf and is interactively reduced by rising wet period and higher temperatures. Mrs. M. Diaz de Ackerman, M.S. candidate, Dr. D.J. Cox, Dr. Hammond and I found resistance among winter wheats to geographically differing strains of the tan spot fungus. Mr. B.J. Nagle, Ph.D. candidate, Dr. R.C. Frohberg and I determined that the inheritance of resistance to tan spot in hard red spring wheat is polygenic. Mr. E. Elias, Ph.D. candidate, Dr. R.G. Cantrell and I found that the inheritance of resistance to tan spot in durum wheat is polygenic and developed field inoculation procedures. Dr. Cox and I found resistance to tan spot among winter wheats and that susceptibility increases with increasing leaf age.

Mr. J.G. Jordahl, M.S. candidate, Dr. Hammond and I determined the interrelated effects of wheat genotype, leaf age, growth stage, fungal isolate and wet period on tan spot lesions; we detected very high levels of resistance to tan spot in Chinese wheats collected by Dr. S. Rajaram of CIMMYT in China. The most resistant of these wheats are now in our breeders programs and at research centers around the world. We are continuously testing resistant crosses in our breeders programs to develop new tan spot resistant commercial cultivars.

World wide contributions on tan spot are coming from an increasing number of wheat workers. Dr. Bill McDonald of the Canadian Federal Laboratory at Winnipeg produced spores of the tan spot fungus on artificial media. Dr. T.N. Khan in Australia related spore production to a light/dark period. Dr. H.W. Platt in Saskatchewan, Dr. G.N. Odvody in Nebraska and Dr. L. Lamari at Winnipeg developed procedures to expand spore production for screening for resistance. Starting in 1979 Dr. R.G. Rees et al. at Toowoomba, Australia detected high resistance to tan spot, charted tan spot epidemiology and established the value of partial resistance in commercial Australian cultivars.

L.S. Gilchrist found levels of resistance in Mexico differing from those in North Dakota. T.S. Lee and Dr. F.J. Gough in Oklahoma detected single gene resistance in the wheat Carafin 12. Dr. W.W. Bockus and his students in Kansas related increasing tan spot severity to increasing leaf age and related a protein toxin produced by the fungus to severity of tan spotting. Drs. L. Lamari and C.C. Bernier at the University of Manitoba confirmed the toxin, and found genotypes with high levels of resistance and a simple gene relationship between isolate toxin production and a necrotic phase of tan spot. Researchers at NDSU and other universities are trying to effectively reduce the fungus on wheat leaves and in wheat residue with chemicals or microorganisms and reduce tan spotting with fertilizer regimes. We are detecting tan spot, screening for resistance and exchanging resistant seed in more and more wheat growing areas of the world.

We are now able to work effectively with the tan spot fungus, learning more about its strengths and weaknesses and approaching genetic control. In 1981 Dr. H.R. Lund funded an international workshop on tan spot at Fargo, with wheat boards and companies assisting and CIMMYT pre-purchasing many copies of the proceedings. Interest in another workshop is growing. Research into our problems is coming from the efforts of many people around the world. You can do it with help and cooperation.

Don Priebe, Chairman, Agricultural Education

All organizations need appropriate and effective leadership to enable them to carry out their missions effectively. Such leadership is always needed. It surely appears to the writer that proactive leadership is especially needed at this time in the field of agricultural education, as broadly defined.

For the purposes of this discussion, agricultural education in the public sector will involve a family of organizations and programs. These include agricultural education (formerly vocational agriculture) for secondary students, post-secondary students, and adults; colleges of agriculture; the extension service; and the experiment stations. This related group faces particularly challenging issues at this point in our history.

What are the special challenges facing the agricultural education and research family today? One pervasive, continuous, and obvious challenge is changing technology. While this trend is long-term and not new, it does seem that the rate of change merits careful consideration. A second challenge is the changing nature of our clientele. This includes fewer farmers, fewer college students with agriculture backgrounds, and more individuals involved in agriculture on a part-time basis. A third issue is the restructuring of our rural areas. Population declines and regionalization of many businesses have led to drastic changes in small towns and rural institutions. This has been a long-term trend which appears to be continuing. A critical fourth issue is the change in our financial support base. There is increasing competition for scarce public resources combined with a more limited political influence by and for agriculture.

These are very brief descriptions of four critical issues facing agricultural education and research today. There are many others as well. Where we are faced with such issues — effective and appropriate leadership becomes even more important.

For the purposes of this discussion, leadership is defined as helping others to define, prioritize, and reach their goals. Such leadership can help the group chart the general course, marshal the resources, plan the strategies, stay on course, make changes as needed, and persist even in difficult times. Leadership that can effectively meet such challenges is much more than management (which is surely needed); such leadership is proactive.

Proactive leadership includes vision to see through the haze of pressing current concerns and to view possibilities and alternatives. Such leadership includes the ability to help the group choose alternatives and commit themselves to a course of action. The leaders must plan and help others plan with some structure and regard for roots but with much flexibility. Effective leaders have a commitment to their organizational mission, their clientele, and the members of their group. The organization will not effectively meet its goals for long without members who are involved, productive, and who envision themselves as important and valued contributors. This is an important task of effective leaders. Effective proactive leaders in today's agricultural education family must be risk-takers. We must seek new and untried paths. This requires courage and the ability to accept risk. We have no other choice.

Effective leadership is always needed. It is an especially critical need in the agricultural education and research family today due to the many significant issues we face. Our challenge is to build upon the efforts of past and present leaders to identify, nurture, and reward even more appropriate and effective proactive leadership.