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Guest Column

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AGROECOLOGY: A Structure for Teamwork

Most agricultural researchers have heard the plea for multi-disciplinary teams. The collective wisdom of the team, it is believed, has a greater vision than the individual. Cereal breeders, for example, have worked with agronomists, pathologists and cereal scientists to produce new varieties which are favorably adopted by farmers, tolerant to disease and high in milling quality. The goal is clear and each understands their role in achieving the end.

Such success has been more difficult in other areas of agricultural research. Some of the problem lies with the structure of our institutions. Land-grant universities are comprised of departments, each of which houses a discipline, such as pathology. Within each department resident faculty who have specialized either by some taxonomic criteria, such as a particular disease, or by the level of system organization at which they study, such as the farm, crop, whole-plant, genetic, cellular, or molecular levels. From the practical standpoint, we have need for these disciplines and levels simply for a place to organize, file, and retrieve the increasing load of information.

As specialization increases, however, communication, understanding, and appreciation of other disciplines and levels of system organization becomes difficult. It is easy to explore and teach what the discipline suggests without consideration of the effects it may have upon others. It is difficult to work in teams where criticism and compromise are necessary at each and every step.

If we are to best serve agriculture in the long run we must develop a framework to analyze and solve problems from all points of view. Economic, environmental, and sociological implications of agriculture will be increasingly demanded by the public. The surfacing of these concerns has much to do with the lack of representation of these disciplines on our research teams. This has not been entirely from a lack of appreciation. Unlike the breeding example, some of the most urgent information asked of agricultural research today is not familiar. Often, we don't know who should be on the teams because we don't know which disciplines will eventually be affected. A new era is challenging traditional disciplinary thought. And most certainly it is causing many to be insecure about the role they play in the big picture of agriculture.

What is needed is a framework, a glue, which functionally binds the disciplines and keeps an acceptable goal in focus. Such a glue is found in the level of system organization which has been sorely missed in agriculture — the science of ecology and the level of the ecosystem. It's been fashionable to work at the next lowest level — agronomists become

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On the Cover: Blaine Schatz, associate agronomist, and John Gardner, superintendent, Carrington Research Extension Center, check out strip cropped sunflower and soybeans, part of the research on alternative production systems being conducted at the center. Photo by Steve Zwinger.

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are usually considerably lower than annuals. Intermediate wheatgrass *(Thinopyrum intermedium)* is currently being studied as a perennial grain (Wagoner et al., 1989). Many other perennial plants have crop potential, including all types of grasses, legumes, sunflower and flax.

Because of yield limitations, perennials may be most quickly adopted as companion crops. Black medic *(Medicago lupulina)* and several other alternative legumes are being investigated as living mulches under annual crop canopies. The requirements of such companion crops are low water use, the ability to perpetuate themselves through self-seeding, and if necessary, ease of control with tillage. A living mulch could provide year around soil cover, which would reduce erosion and fix nitrogen.

In summary, crop production alternatives have long been investigated for North Dakota. Current research initiatives at the Carrington Research Extension Center are guided by an ecosystem level analysis of production constraints. It is hoped that results from these studies will contribute to the economic and environmental security of North Dakota Agriculture.

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physiologists and genetists become cytogenetics. Molecular biology is the current frontier. While agriculture needs answers at these fundamental levels, it also needs a complementary effort at the ecosystem level. The science of ecology has methodologies for studying interactions among all the components of the ecosystem and plays no favorites.

Using the systems approach offered by ecology in agriculture — agroecology — is not a new idea but is one who's time has come. Such a structure cannot only guide the natural scientists through the development of new technologies, but also provides a place for the social sciences. People are part of the ecosystem and place both a monetary and social value on products which flow in and out of the system. Let's scrutinize new technologies through such a team operating from the needed disciplines and up through the agroecosystem level.

This is not a call for an end to our current disciplinary research. It is a recognition of maturity among the agricultural sciences and the need for interaction among all levels of system organization. As the ecologist E.P. Odum puts it, "To understand the forest, we must study the forest; as well as the trees."

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