ORGANIC FARMING RESEARCH FOUNDATION

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Subject: REE-2009-0001, "The Roadmap"

The Organic Farming Research Foundation (OFRF) is a research and education grant-maker and educational organization dedicated to the improvement and widespread adoption of organic farming systems. Since 1995 OFRF has also maintained an active interest in the priorities and performance of the USDA's Research, Education and Economics mission area.

GENERAL COMMENTS

OFRF appreciates the opportunity to comment on USDA's "Roadmap for Agricultural Research, Education and Extension." Please note that OFRF strongly supports and endorses the comments submitted by the National Sustainable Agriculture Coalition (NSAC) www.sustainableagriculture.net and the Pesticide Action Network of North America (PANNA) www.panna.org. OFRF is an affiliate of both organizations. The following comments are submitted as additional specific points within the broader comments submitted by NSAC and PANNA.

The over-arching challenges facing U.S. and global farming and food systems require a fundamental re-thinking of the public science enterprise, not merely an increased devotion to "fundamental" research objectives. That is, the overriding national purpose should be to achieve highly productive, diversified, zero-waste, nontoxic, socio-economically healthy, ecologically resilient, regenerative agricultural systems. Building such systems – solving the simultaneous equations - must be the destination of the Roadmap.

U.S. public agricultural science and education institutions in general are poorly organized, under-powered and paradigmatically impoverished for delivering success on such a transformed mission. The Roadmap process is an opportunity to plan for re-orienting and upgrading the nation's collective agricultural science and education assets for the urgent needs at hand.

Questions Posed by the Federal Register Notice

1. What types of current and future critical issues (including those affecting citizens, communities, and natural resources) does agriculture face that no USDA entity could address individually?

Agriculture faces many current and future critical issues that have significant implications for individuals, communities, and the environment. Thoughtful catalogues of these issues are contained in the Roadmap comments submitted by both NSAC and PANNA. We wish to emphasize and comment on the interrelatedness of many issues.

Despite the small fraction of U.S. residents directly involved with farming, ranching or forestry, agriculture is still a central human activity. Agriculture receives effects from, and must respond to, myriad aspects of society and the environment. The consequences (both positive and negative) of agricultural systems are equally broad. More to the point, these multifunctional relationships are *systemically* related. The inherent, complex interconnectedness of environment, communities and individuals with agriculture is poorly addressed by agricultural science in general and the organization of USDA research and education resources in particular.

The essential problem which no USDA-REE entity alone can address is manifesting the paradigmatic shift to understanding agriculture on a whole-systems level, and to building solutions based on multifunctional systems-management. Successful organic agricultural production is inherently reliant on a whole-systems approach. As such, it is the best available platform for developing a holistic research paradigm. A cross-agency effort focused on rapid improvement of organic systems should be a key element of the Roadmap.

The central dilemma for agriculture research is often posed as a conflict between resource conservation and increased food output. This dilemma cannot be resolved by strategies for intensified agricultural production leading to increased pollution of ecological life-support systems. Organic agricultural research and development can be a primary contributor to solving the central through *ecological intensification.* This idea is explained in a document entitled, "Vision for an Organic Food and Farming Research Agenda to 2025: Organic Knowledge for the Future" published by the International Society for Organic Agricultural Research (Niggli, 2008).

> Intensification in conventional agriculture is understood primarily as using a higher input of nutrient elements and of pesticides per land unit. It also means more energy (direct for machinery and indirect for inputs). Finally, it focuses on better exploiting the genetic variability of plants and animals; to do so, all available breeding techniques, including genetic engineering, are used.

Eco-functional intensification means, first and foremost, activating more knowledge and achieving a higher degree of organization per land unit. It intensifies the beneficial effects of ecosystem functions, including biodiversity, soil fertility and homeostasis. It uses the self-regulating mechanisms of organisms and of biological or organizational systems in a highly intensive way. It closes materials cycles in order to minimize losses (e.g. compost and manure). It searches for the best match between environmental variation and the genetic variability of plants and crops. It also means increased livestock welfare, with a positive impact on the health and productivity of animals. It uses and provides more farm labour per land unit, principally such of high quality and professional satisfaction. Knowledge is the key characteristic of eco-functional intensification.

Eco-functional intensification is not exclusive to organic agriculture but is most widely used there, because its requirements rule out other means of intensification. It offers a huge opportunity to produce more food without compromising the quality of the environment, the quality of foods or the life quality of farmers and the welfare of farm animals. Finally, eco-functionally intensified production systems are more resilient and highly adaptive to the unpredictability of climate change scenarios.

2. What criteria should USDA use to prioritize agriculture science (i.e., research, education, and extension) investments into these issues?

Agriculture has potential to provide multiple benefits to the environment and society in addition to producing the nation's food and fiber. In order to realize this potential, agricultural research must be conducted with an explicit acknowledgment of agriculture's larger environmental, economic, and social impacts.

As unintended consequences of focusing almost exclusively on maximizing agricultural yields become increasingly clear[1], the need has emerged for agricultural research that embraces a wider perspective of agricultural systems.

Some of the benefits that agriculture can provide to society include

- Increased carbon sequestration
- Reduced greenhouse gas emissions
- Improved soil and water quality

[1] Selection for large-scale, monocropped operations and, in the case of livestock, massive, pollution-generating, and inhumane confinement animal production; large-scale loss of family farms; fertilizer and pesticide contamination of surface and ground waters; soil loss through erosion; reduced nutrient content in food. [cites?]

- Wildlife and biodiversity conservation
- Greater farm profitability
- Rural employment opportunities
- Nutritious food and improved public health

One advantage to recognizing these benefits is that agricultural research can also realize numerous objectives in a single project. For example, a systems approach to optimizing nitrogen management in organic cropping systems could:

- Use an ecological accounting tool[2] to compare environmental impacts of varying fertilization strategies
- Include cost-benefit analysis to determine profitability for growers
- Analyze carbon sequestration potential for each fertilization strategy

To realize agriculture's multiple benefits, agricultural research must be conducted in which

- Increased yield is not the sole focus
- Full cost accounting of all production practices is made; externalized costs are clearly identified and quantified
- Ecological services provided by well-managed agricultural systems are recognized, evaluated, and preserved to the greatest extent possible.
- Nutritional content of food and feed products are valued as yield

OFRF recommends that agricultural research funded by USDA meet the following criteria:

- Use multidisciplinary and transdisciplinary collaborations amongst scientists
- Apply "hierarchical reductionism," a research approach that utilizes both reductionist and systems methods and explicitly acknowledges that "understanding cause and effect at one level helps us understand emergence at higher levels" (Phelan 2009)
- Demonstrate awareness of scale of applicability of developing technologies. To staunch loss of family farms, prioritize research that develops production and marketing practices useful to small- and medium-scale farms ("agriculture of the middle")
- Grower involvement—as the most advanced practitioners and theoreticians in agricultural science, farmers and ranchers must be included as advisers and participants in agricultural research to the greatest degree practical

4. What are some examples where agricultural sciences are successfully coordinated for maximum benefit? Why are they successful?

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[2] Possible tools include ecological footprint analysis, embedded energy ("emergy") accounting, and life-cycle analysis (LCA). CSREES Ecosystems Services Paper.

Two primary examples within USDA are the Sustainable Agriculture Research and Education (SARE) Program within CSREES, and the Sustainable Agriculture Systems Laboratory team at the USDA-ARS Beltsville Agricultural Research Center.

Within the land grant university system, the Center for Environmental Farming Systems (CEFS) in North Carolina is an example of successful coordination of many stakeholders to create a multi-faceted, multidisciplinary sustainable and organic research, extension, and education program.

Since CEFS was founded in 1994, it has evolved beyond being a research site and resource for the region's Extension personnel and farming community. Demonstrating resilience and innovation in its programming, CEFS has developed new programs in response to emerging social and environmental issues. Two examples:

A. CEFS has responded to increasing public interest in local food and community-based food systems. Now, in addition to educating college students and Extension agents, CEFS offers training and activities for groups involved with public health and nutrition, youth, food justice, consumer issues, policy, city and county governments, and others. Currently, CEFS is working with an extensive group of stakeholders to develop a statewide action plan for developing a local food economy.

B. CEFS has developed programs in on-farm energy conservation and production, reducing agricultural energy use, and reducing greenhouse gas emissions from farms. CEFS has hosted workshops to help producers reduce their energy costs and explore energy alternatives. They are utilizing SARE Professional Development funds to train Extension personnel as certified energy advisors. CEFS is seeking funding to evaluate carbon sequestration and greenhouse gas emissions in their long-term farming systems experiment.

CEFS is a partnership between North Carolina State University, North Carolina Agricultural and Technical State University, and the North Carolina Department of Department of Agriculture and Consumer Services.

The 800-ha CEFS site was dedicated in 1994. Confinement dairy, confinement swine, and beef production facilities were already on-site. University faculty engaged with NGOs, farmer groups, and other stakeholders and formed teams to prioritize what kinds of units would be developed further.

CEFS currently has 7 "Research and Demonstration Units":

1. Conservation tillage
2. Farming systems research and organic
3. Dairy, emphasizing pasture-based production
4. Beef
5. Swine, utilizing deep-bedded hoop houses

6. Small Farm, where specific research projects are nested into the whole farm design
7. New organic research. “The mission … is to supply a research environment that approximates as much as possible a working organic farm.”

CEFS developed a comprehensive, graduate-level training program in organic agriculture for Extension agents in 1999. For many in Extension, this was their first introduction to organic concepts. Outcomes of the training included more knowledgeable Extension personnel, successful cooperation with producers applying for SARE grants, and ongoing organic training sessions in some counties.

In 1999, the Sustainable Agriculture Summer Internship program was offered for the first time. This ongoing internship provides classroom instruction, farm field trips, and hands-on research and field experience for students, many of whom have no prior experience in agriculture. The Internship continues today.

In 2004, the interdisciplinary faculty team at CEFS developed an interdisciplinary undergraduate Agroecology Minor program in the Dept. of Crop Science at NCSU. An Agroecology Concentration in the new Plant and Soil Sciences degree was developed for fall 2008 and is expected to be the basis of a new Agroecology degree program.

According to Nancy Creamer, director of CEFS from 2000 to the present, CEFS’s success can be attributed to:

*Existence of a facility dedicated to exploring agricultural alternatives
*Creation of an interdisciplinary team that allowed the few like-minded people in each department to find support for their ideas
*Lengthy initial planning period
*Supportive administrators
*Positive outreach to the community
*Focus on areas of agreement with the conventional ag community rather than on areas of difference
*Strong and committed leadership

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