

Organic Agriculture Research Alliance (ORCA)

Reflections on the Discussion Forum

1. Introduction

A draft paper proposing the establishment of an international Organic Research Centres Alliance (ORCA) was widely disseminated in the fall of 2008. ORCA is a project proposal seeking to enhance organic agricultural knowledge by networking and strengthening a number of existing institutions and elevating them as collaborative centres of excellence in organic agriculture research.

From 17 November through 15 December 2008, the Food Agriculture Organization (FAO) conducted the ORCA Forum, an electronic consultation that allowed any interested person to submit comments on the draft paper and engage in a moderated dialogue about how best to facilitate organic agricultural research and specifically, about ways in which the draft paper could be improved. The draft paper and the contents of this consultation are accessible at: www.fao.org/organicag/oa-forum. Forum participants provided comments on the ORCA proposal from the “big picture” level all the way to comments about intricate details within the ORCA design.

As stated at the outset of the Forum, our intent is to refine the ORCA concept based on the comments received, finalize the paper, and then share it with potential donors. Throughout, we have sought to be transparent about our efforts and looked for ways to involve people in designing ORCA from the inception phase. It is in this spirit that this reflections paper is written. Herein we react to various Forum comments and attempt to explain the evolution of our thinking about ORCA before finalizing the ORCA project proposal and disseminating it in March 2009.

2. Affirmation of Need

Without exception, ORCA Forum participants affirmed the need for research investments in organic agriculture. Forum participants expressed gratitude to FAO for spearheading the ORCA effort and for providing the opportunity to participate at this early stage when design and plans are emerging but flexible.

From all areas of the globe, participants cited examples in which research, as well as extension and training in organic agriculture, were seriously under-resourced or non-existent. As expected, the need was especially pronounced in the developing world. Many participants shared experiences from their countries, describing the extent to which organic agriculture is practiced and the challenges faced by farmers, traders, and others in the food distribution system. We also learned more about a few nascent collaborations between institutions in the North and South, organized to share knowledge, but which also suffer from lack of resources.

3. Relationship to Existing Networks and Institutions

Several participants expressed concern that the ORCA proposal failed to fully describe existing organic research networks and institutions. In particular, we were advised to include greater discussion of several initiatives, mentioned in the proposal, but only briefly described. These initiatives include Core Organic, Organic Eprints, Organic Edunet, the International Centre for Research in Organic Food Systems (ICROFS), ERA-NET, GLOBALORG, and ISOFAR. In the final ORCA paper, we will expand our description of these and other initiatives to advance organic agricultural research at the transnational level. Relevant to the need to improve the overall description of existing research efforts, FAO staff are currently at work collecting information on organic research collaborations within the continent of Africa. Participants also requested that we describe North-South organic research collaborations in the few instances where they exist, or for which plans are underway. It is our intention that the final ORCA paper include a more comprehensive and in depth assessment of the existing infrastructure for organic research.

We believe a fundamental concern underlies many of these requests for further explication of existing institutions. We expect that some Forum participants wonder whether ORCA will compete with and potentially overshadow efforts now underway to promote organic research, possibly disrupting good initiatives that have been launched and nurtured with considerable effort. As one Forum participant asked, why leave existing institutions wondering how they fit into ORCA rather than beginning with these institutions and explaining how ORCA fits in with them?

It is certainly not our intention for ORCA to eclipse existing efforts, but rather, it is our hope and expectation that ORCA will strengthen them along with the entire organic sector of agriculture. It is critical that this is made clear in the final ORCA paper. To this end, we will redraw our pictorial representation of ORCA. We initially choose a wheel to represent ORCA, believing it best depicted the collaborative nature of the Alliance of Centres that make up ORCA. But the wheel may contribute to the confusion about the relationship of ORCA to existing efforts and institutions because it is self-contained. While we have yet to settle on the redesign, we are working to come up with a pictorial representation that encompasses several major transnational research efforts so that the Centres that comprise ORCA are seen as nodes, albeit major ones, within a larger network of organic research efforts. In this way, existing institutions will be able to grasp how the various transnational efforts, including ORCA, will complement and strengthen one another.

A further concern relates to funding. With limited donors, and at a time of global financial distress, will ORCA, particularly at the scale proposed, absorb available resources to the severe detriment of existing efforts? We expect that some readers are contemplating the relative value of investing in something new versus utilizing all available funds to strengthen what exists. The fundamental question is thus raised: if adequately supported, would existing institutions suffice and eliminate the need to begin anything new? We think not. Prior to drafting the ORCA proposal we considered this very proposition, along with the potential for the CGIAR system to accommodate organic research needs. Our conclusion was that existing infrastructure was insufficient to address the magnitude of need. As well, the ORCA concept was not duplicative

of other efforts. The overwhelming positive response to ORCA, described in the prior section, convinces us that we are correct in our assessment.

It is a universal truism: available funds never match the enormity of need. However, our experience is that sectors most successful in attracting funding are those which are vibrant, have enthusiastic participants driven by a common vision, and are significant in terms of size, creativity, and relevance. Donors want to be convinced that their investments will result in social change and scientific breakthrough. By launching ORCA, ongoing efforts in organic research will be greatly empowered and accelerate, providing the necessary impact that is required for sector-wide funding success.

4. Research Continuum

Repeatedly, Forum participants described a great need for extension and training in organic agriculture. As one participant stated, organic research is not an end in itself. This is a sentiment with which we are entirely sympathetic. Extension and training are critical to ensure that research results are moved from the “laboratory” into the field and adopted across a variety of geographic areas and production systems. But as described in the last section, ORCA will be working collaboratively with other networks and institutions, many of whom, like the Food and Agriculture Organization, exist to carry out development activities and extend production knowledge. We do not envision ORCA having the capacity to take on this role, although we agree wholeheartedly that without such activities the entire enterprise flounders. For this reason, in the final ORCA paper, we will seek to better describe how ORCA will partner with other organizations to transfer technology and knowledge produced by ORCA.

One Forum participant argued that to be successful, organic agriculture requires a new epistemology. Others mentioned farmer-field-schools and on-farm field trials as important ways to include farmers in the research enterprise. Another participant raised the concern that important small-holder organic farming practices are only transferred by word of mouth, from farmer-to-farmer and that this critical knowledge is potentially lost without a more formalized system to document and evaluate it. All of these very good inputs into our Forum discussion prompt us to reiterate our vision of the role of farmers in ORCA, which is integral to the research enterprise.

We want to state emphatically that we do not view farmers as passive recipients of ORCA research. Rather, we expect farmers to be co-producers of knowledge who are oftentimes partnered with technically-trained scientists to carry out ORCA-sponsored research and who may sometimes be involved in projects that are entirely farmer-led. In Section 3.6.2 of the ORCA proposal, we describe “farmer-scientists”, herald farmer contributions to organic knowledge, and articulate our desire to have farmers lead ORCA work. In Section 3.6.1, we describe the ORCA model for research, which is based on trans-disciplinary, participatory research and includes a variety of stakeholders including farmers. In this section, we also suggest that including farmers in the research enterprise is an effective strategy for catalyzing adoption of research results. Finally, in Section 3.2, we state that ORCA research must be relevant to farmers and that all research projects, from inception, will be evaluated and chosen for their applicability to the

problems faced by food producers. This mandate, we believe, will result in scientist efforts to co-create research agenda in collaboration with farmers and other stakeholders.

Because the ORCA draft paper described such a central role for farmers and implicitly abandoned the traditional paradigm that separates out the roles of scientists, extension agents, and farmers along a research continuum, we were then, and continue to be, content with our proposed model. However, upon reflecting on the ORCA draft paper following the Forum discussion, we are struck with the idea that our overarching vision for ORCA: “Organic research: mainstream, robust and worldwide by 2025” fails to capture the truly innovative construction we have proposed. Indeed, the vision as articulated does not imply anything about farmer involvement nor does it imply anything about increasing adoption of organic agriculture, which is the ultimate goal of ORCA. Relevant to this discussion, a Forum participant suggested amending the vision statement by adding that such research be valued by farmers and policymakers worldwide. While we are not yet sure how we will rearticulate the vision, the final ORCA paper will include slight modifications to better capture the full extent of ORCA’s purpose.

5. Distributing the Workload

The wheel diagram that accompanied our draft ORCA paper was an attempt to provide a visual representation of the various parts that make up the whole of ORCA, in its ideal and complete construction. With this wheel, and accompanying text in which we described sectors and resource concentrations, we sought to: (1) prompt dialogue that would identify and prioritize the many research needs in organic agriculture; (2) describe a division of labour such that no one institution would be overwhelmed by the breadth of the ORCA agenda, and at the same time, depict a system in which a variety of institutions would play leadership roles; and (3) begin the process of mapping how these various research pursuits might fit together in ways that would be mutually reinforcing and provide holistic research advancement in organic agriculture. In posting the ORCA draft paper, we expected to receive many comments about our choices for, and coupling of, sectors and resource concentrations. While we received far less feedback than anticipated, which may indicate general satisfaction with the overall model, several commentators provided important insights that will guide us in drafting the final paper.

Forum participants suggested that several important research topics were absent from our discussion. Requests were made to include explicit reference to the need for research on botanicals, pollination, and post-harvest food spoilage and waste. We were asked to strengthen the discussion on the need for research related to pest and disease management and the study of local supply chains within market research. Several participants suggested research on consumer behavior beyond what had been indicated under the Centre on Economics, Markets and Trade. On a slightly different topic, one Forum participant suggested that our discussion failed to describe equal participation of processors and private industry with that of farmers in the construction of research agenda. All of these comments are helpful and relevant modifications will be made in the text.

One Forum participant asked us to rethink our construction of the Centre on Nutrition Quality and Health. Our discussion left this participant with the impression that this proposed Centre

would largely be occupied with evaluating antioxidants and secondary plant metabolites, a current focus of research in food secure countries where people are capable of paying for food with high quality attributes, such as enhanced Omega 3 fatty acids. The participant asked us to balance our discussion with greater reference to the global differences in diets and the need to have research driven by food security needs. While we continue to envision a role for the types of food quality research described in Section 4.1.9, we concur with the suggested emphasis and will adjust this discussion to reflect food security priorities.

More than one Forum participant took issue with the designation of ‘climate change’ as a resource concentration. One Forum participant suggested that climate change should be a sector rather than a resource concentration; another suggested that climate change research be included within each of the 10 Centres now proposed. We agree with the sentiment underlying these suggestions: climate change is one of the greatest challenges facing agriculture. For this reason, the revised ORCA paper will propose the establishment of an 11th Centre for climate change. This centre will be tasked with global assessments and developing methodological tools to assess soil carbon sequestration, not specific micro-climate adaptation and mitigation measures, which will be carried out in each of the agroecological centres.

Forum participants questioned whether certain research topics should be embedded in each ORCA agroecological centre. These topics include seeds and breeds and, as noted above, climate change. Some participants suggested that all 10 Centres undertake research on markets and trade in the same way that soil research is placed within each spoke of the wheel. In all these comments, we detect uneasiness with the basic concept of dividing up the workload. As one participant states, organic agriculture has always been very local in its focus and holistic in its application. We agree that local adaptability of organic methods is critical and that farmers and processors require integrated knowledge to be successful. We wish to remind Forum participants that centres within ORCA may, and very likely will, carry out extensive programmes in organic research beyond those duties delegated to them as an ORCA centre. The division of labour depicted in our wheel merely indicates which research functions ORCA will financially support and for which each ORCA Centre is expected to be a specialist – meaning the centre will develop extraordinary expertise in the topic and be responsible for facilitating knowledge exchange across research networks. Thus, our concept does not envision each and every ORCA centre undertaking the breadth of work described in the draft paper which is now allocated across 10 sectors and 20 resource concentrations.

6. Stepwise Implementation

As described in Section 6.2 Budget, at this time no funds are dedicated to ORCA beyond FAO support for completing the project proposal and sharing it with potential donors. We launched this effort with optimism and have been further encouraged by the outpouring of support for the draft paper. Yet we have no way of estimating our potential to secure implementation funds and we must be realistic. It is highly unlikely that we will receive the annual US\$ 20 million necessary for support of all 11 centres in 2009, and this magnitude of funding may not be achieved for several years. It is more likely that donors will provide funds in smaller amounts over time and that this will result in ORCA being built incrementally.

Because of this, we wish to re-emphasize that we anticipate changes to ORCA over time and believe the ability of ORCA to adapt to changing circumstances is an inherent strength. We understand how one Forum participant could feel that ORCA seemed complex and possibly inflexible – as he was reacting to the fully articulated and integrated vision put forth for a completely realized ORCA. But we must stress that there are many ways to achieve the overarching vision for a robust organic research enterprise, and we expect friendly modifications to our proposed ORCA design. Donors will likely bring their own priorities to bear on ORCA design, research priorities will evolve, and existing institutions seeking to host ORCA activities may not perfectly match the divisions of labour for ORCA centres described in the draft paper. None of these realities seriously disturb the founding concept, nor the use of the ORCA paper as a roadmap for future success.

The step-wise implementation will allow us to adapt the ORCA concept to account for ongoing efforts in organic agriculture. For example, in Section 3.4.2 Twining, we describe our strategy to partner institutions in the North with those in the South as a way to share resources and expertise and strengthen southern institutes. Forum participants applauded this strategy but asked us to think more broadly so that triangular partnerships and potentially other sorts of North-South collaborations could be included in the ORCA design. We will adjust the language in this section to reflect more openness on how to apply the principle of North-South collaboration over time.

7. Centres Without Walls

While we did not use the phrase ‘centres without walls’ in the draft document, we wish to re-assure Forum participants that this is our concept for ORCA. In the draft paper, we use terms like “virtual laboratories,” and describe ORCA as being built upon existing institutes.

In the final paper, we will seek to strengthen this language so that our intention is clear: no buildings will be built with ORCA funding. We do not aim to build new institutions but rather our goal is to strengthen and network those that exist. We expect, as described in Section 5.1.7 of the draft paper, ‘Dedication of Resources to Support the Centre’, that applicants seeking to host an ORCA Centre will offer adequate facilities, land, and other types of infrastructure relevant to their proposed area of work. Like CoreOrganic in Europe, also described as a centre without walls, ORCA will have a small central administrative office. The purpose of this office (described in the draft paper as an FAO secretariat) is to provide administrative and fundraising support, monitoring and evaluation activities, and to assist the ORCA Facilitation Board - in other words, to take on those coordinating activities beyond the scope of an individual centre.

It is interesting that one Forum participant suggested the CGIAR Challenge Programme as a potential model for ORCA. In Section 2.4.1 of the draft ORCA paper, we briefly describe our effort to explore the potential of the CGIAR system, of which the Challenge Programme is a part, to significantly expand efforts in organic agricultural research. Although we did not specifically reference the Challenge Programme in the draft paper, we did study it as we designed ORCA.

There are many similarities between ORCA and the Challenge Programme. The Challenge Programme is a time-bound, independently-governed programme under the auspices of the CGIAR system. It operates by dedicating money for research on a high-priority problem with global or regional significance. The dedicated fund creates an incentive for people and institutions to work cooperatively to address the high priority problem. The Challenge Programme model is very appealing and we sought to replicate certain aspects of it in our ORCA design. As proposed for ORCA, the Challenge Programme creates ‘centres without walls’ by operating through host institutions. For example, last year, upon launching the Challenge Programme on Climate Change, Agriculture and Food Security, a call was issued for expressions of interest from institutions interested in hosting the initiative. As envisioned for ORCA, the Challenge Programme creates alliances between institutions; for example, the HarvestPlus Challenge initiative, established a few years ago, is a global alliance of institutions and scientists working collaboratively on micro-nutrient malnutrition.

We anticipate that some may wonder why not skip ORCA altogether and alternatively launch a Challenge Programme for organic research, within the structure and under the auspices of the CGIAR system. We considered this strategy, but we were dissuaded for three reasons. First, the Challenge Programme exists to facilitate research for discrete periods of time. We believe, and readers of the ORCA draft paper seem to agree, that organic research requires a sustained, long-term approach. Second, one of the explicit aims of ORCA is capacity building in the developing world, which is not an articulated goal of the Challenge Programme (although in some cases, its activities have contributed to this). Organic agriculture is significantly place-based and enhancing and documenting local expertise is critical. Third, the “problem” of organic research is not specific enough to fit within the Challenge Programme mandate. The ORCA draft paper describes a staggering breadth of research needs, which cross disciplines, sectors, and geographic borders.

8. Harnessing the Power of the Electronic Age

Several Forum participants suggested the need to think more creatively about the use of electronic media to further the goals of ORCA. Cell phones and short message service (SMS), radio, mobile internet service, electronic billboards, and school computers were among the ideas posted.

The electronic age does present new opportunities, particularly with regard to organic trade. A study by a Tufts University professor, for example, looked at the impact of cell phones on grain markets in Niger.¹ Cell phone service was quickly adopted over a 5-year period and by 2006, cell phones allowed traders to save time in traveling to distant markets to find out how prices differed, which was how traders otherwise got their market information. Adoption of cell phones was associated with more uniform grain prices, both geographically and seasonally. While this is just one example and not directly related to organic trade, it does signify that things are changing rapidly and that we must find ways for the organic sector to keep up and flourish with the use of technology.

¹ Aker, Jenny C., Does Digital Divide or Provide? The Impact of Cell Phones on Grain Markets in Niger (October 2008). Center for Global Development Working Paper No. 154. Available at SSRN: <http://ssrn.com/abstract=1093374>

That said, many of the Forum suggestions were most appropriate to technology transfer and fall in the realm of improved extension and awareness, which we agree is needed but which is not an activity envisioned for ORCA. For example, placing computers in rural schools and helping the overall education enterprise would undoubtedly contribute to better trained farmers and may further adoption of organic agriculture. But it is not furthering a research agenda, which is the role of ORCA. Rather, our further contemplation of technology will relate to the flow of information between ORCA Centres and other research institutes and networks.

9. Institutionalizing Knowledge

Several very important comments were posted regarding the pursuit of knowledge and how we catalog what we learn. First, one Forum participant suggested that organic agriculture is so different from conventional agriculture that ORCA should include a centre focused on epistemology and research methodologies. We do not plan on proposing such a 12th centre, but do concur with the underlying sentiment: organic research can challenge traditional mores. For example, there was a back and forth discussion about the role of biodynamic agriculture and other non-conventional approaches to agricultural production and the extent to which ORCA research should address alternative approaches.

In developing the ORCA draft, we adopted the International Agricultural Assessment of Science and Technology for Development (IAASTD) conclusion that the new research agricultural paradigm should enable voices that are ignored to be heard, including farmers' knowledge and empirical experience not yet considered by the dominant research system. ORCA will be promoting a twin-track approach whereby both mainstream science and field innovations are pursued, even when aspects are not yet considered very "scientific". Extending the research methodology to meet the different needs of the organic and biodynamic communities in particular, and the overall public quest for sustainability, will be part of the ORCA research paradigm.

One Forum participant asked that ORCA generate science directed at the development of good rules and standards for organic certification programmes. We expect that scientific findings of ORCA may, at times, be extremely illuminating for those entities responsible for standard development, but this is not the role of ORCA. The International Task Force on Harmonization and Equivalence in Organic Agriculture (ITF), convened by FAO, IFOAM and UNCTAD is an open-ended platform for dialogue between public and private institutions to discuss organic standards (www.unctad.org/trade_env/itf-organic). We envision ITF, along with the Codex Alimentarius Commission, NARS, and others will translate ORCA findings into appropriate standards that advance the practice of organic agriculture.

An important challenge was issued by one Forum participant: how do you design an alliance that captures knowledge, which resides in individuals so that when they leave the organization it does not collapse or suffer significantly? A related challenge was also raised: how do you avoid what is sometimes referred to as "founders syndrome," a phrase used to describe situations in which organizations created by institutions and/or individuals become exclusive, with few opportunities for new participants to join or have meaningful roles. We believe the ORCA

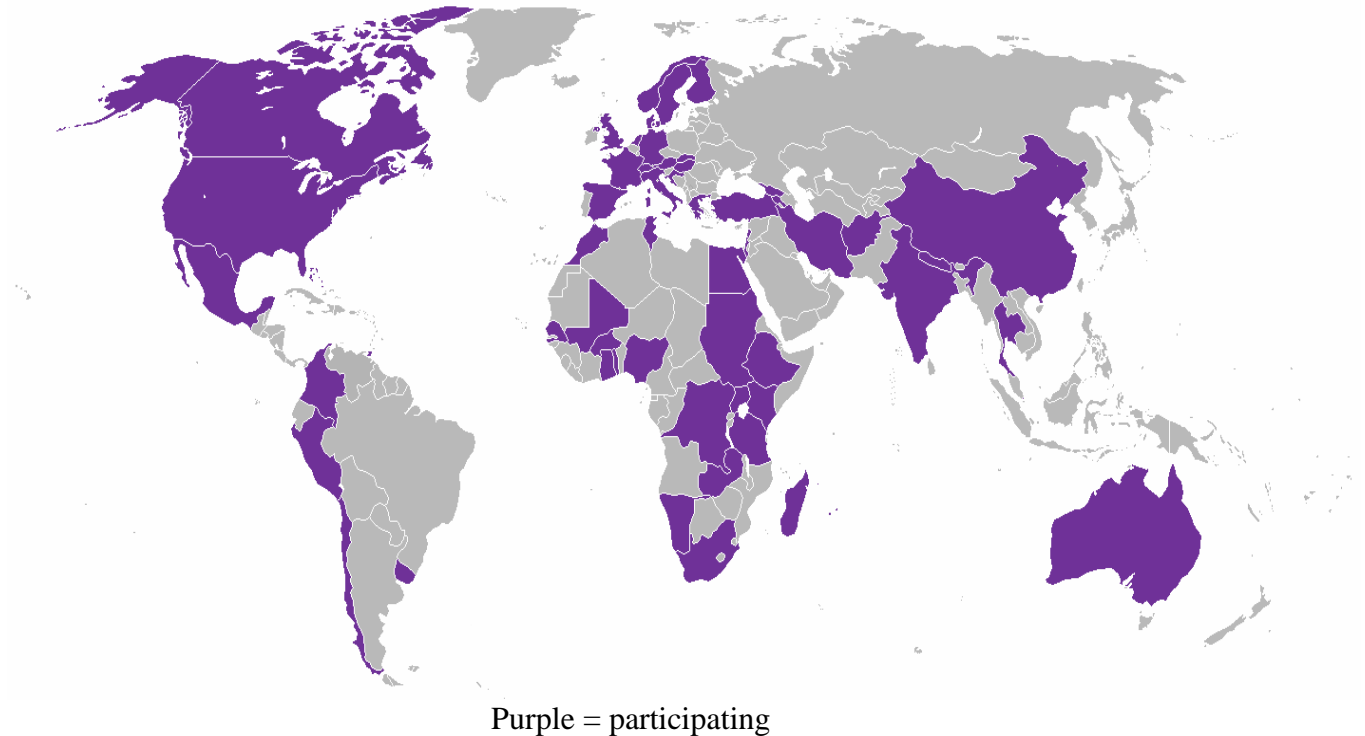
Secretariat must assume leadership in ways that address both these challenges. We envision the Secretariat convening a biannual forum of ORCA Centres to facilitate: (1) integration of the activities of the various Centres; (2) adoption of strategies that will allow the enterprise as a whole to progress in concert; (3) cultivate emerging leaders within ORCA to transition to leadership positions (and replace “founders” when appropriate); (4) interaction with organic research leaders throughout the various networks within which ORCA operates to ensure cohesion and to invite their full participation and ownership of ORCA; and (5) review and devise alternative research approaches.

Analysis of Forum Participation

Prior to opening the Forum on 17 November 2008, the ORCA draft paper was sent to several lists of individuals associated with organic agriculture research. For example, members of ISOFAR were contacted and asked to participate in the ORCA Forum. All told, FAO distributed the ORCA Forum announcement to more than 2 000 people across the globe. In distributing the announcement, we asked recipients to further share the notification because we wanted the process to be open to all. Also, in the fall prior to the Forum commencement, the drafters of this paper sought to inform interested parties through conference presentations and informal networks. For example, FAO presented the ORCA concept at the Organic Regional Workshop at the Asian Institute of Technology in Bangkok, Thailand, in September 2008 and at the Africa Conference on Ecological Agriculture, in Addis Ababa, Ethiopia, December 2008. Our hope was, and is, that word about this effort spreads across the globe.

We have no idea as to how many people actually read the ORCA draft paper. We situated it on the FAO website in such a way that anyone could read and download it anonymously. However, to participate in the Forum itself, people were asked to register. We informed people at that time that their information would become part of a FAO Directory of organic expertise. A total of 211 people from 57 countries registered as Forum participants and entered the requested information into the directory.

ORCA Forum Participants from 57 Countries

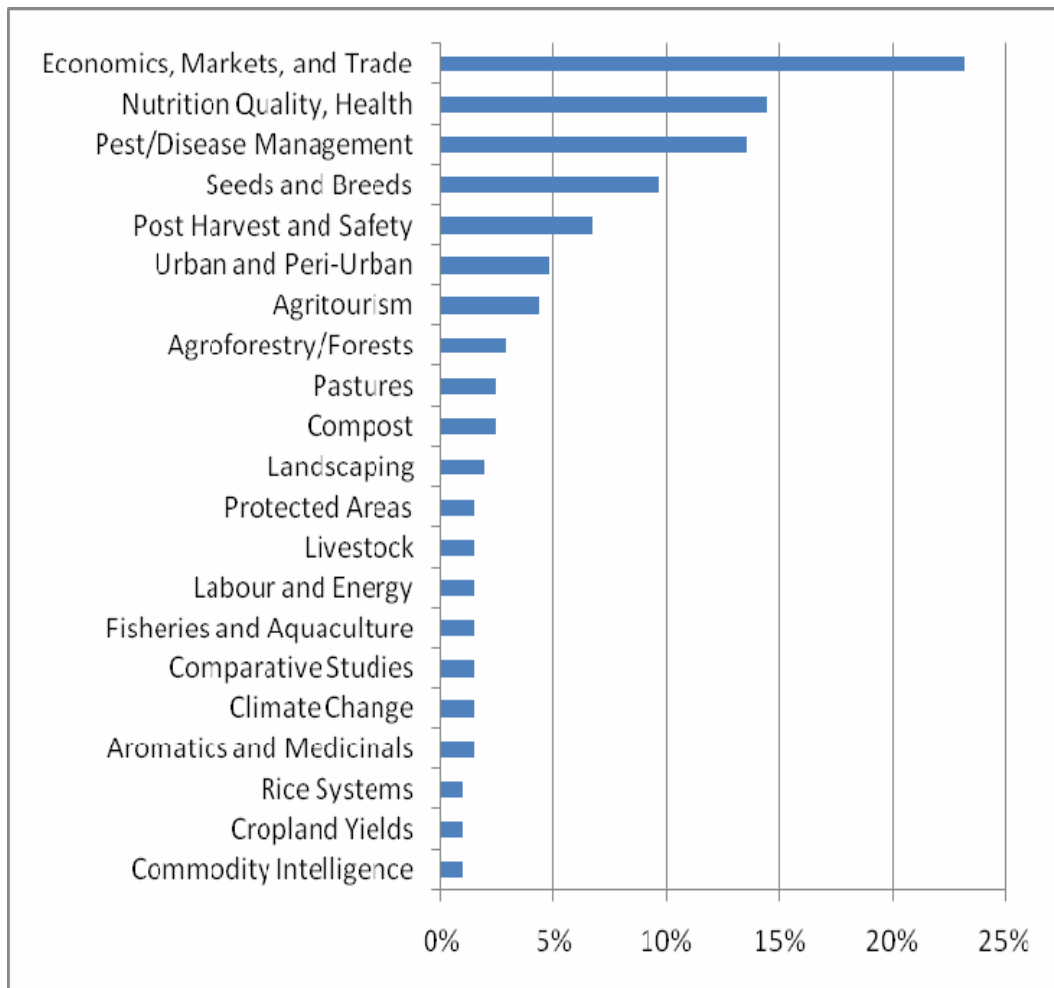


Forum participants were asked to indicate their areas of expertise. In many cases, participants were representing institutions and indicated expertise for their enterprise as a whole. We provide two bar charts to display the information we received. In registering for the Forum, participants were allowed to select an unlimited number of areas of expertise. For this reason, we display the information in two ways. In this first bar chart, we restricted the expertise choice to only the first one listed for each individual or institute. This result is interesting, since part of the Forum feedback was that our treatment of economics, seeds and breeds, and pest and disease management was insufficient and yet these are the areas where, perhaps, organic has its greatest research strengths.

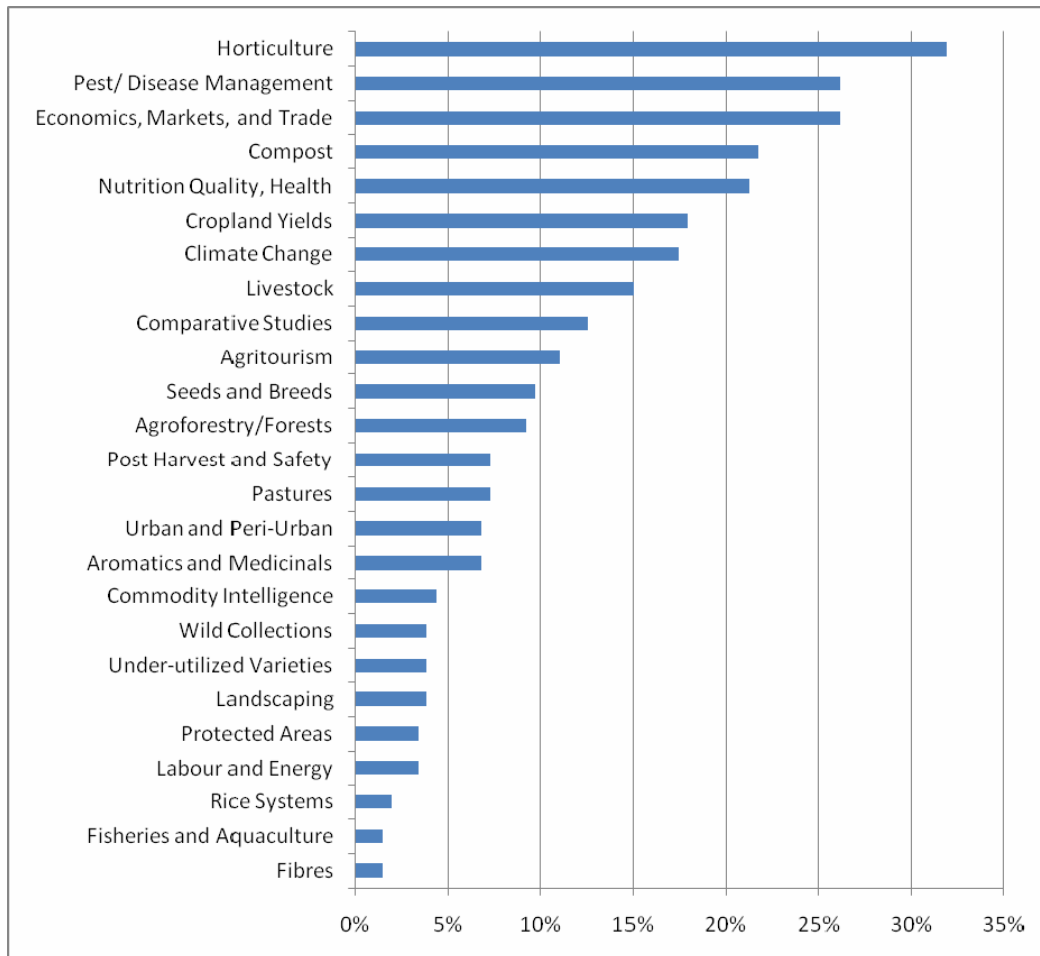
In the second bar chart, all areas of expertise chosen are aggregated. There are a greater number of areas, due to the fact that several of these topics, including horticulture, were not included among anyone's first choice. What is striking about both these bar graphs is the lack of expertise among several topics that have been chosen for ORCA investment. For example, considering the importance of rice to global food security, it is striking how little research expertise may exist relevant to organic rice systems.

The Directory will continue to be built. The Forum participants comprise a small, self-selected sample, of people involved in organic research. Nevertheless, it does provide some insight into potential gaps in our mutual agenda.

Percent of Participants Listing Each Area of Expertise as their First Choice



Percent of Participants Reporting Each Area of Expertise (participants chose more than one)



11. Next Steps

There is much work to do.

Our website - www.fao.org/organicag/oa-forum - will remain an important resource for people seeking ORCA documents and updates on ORCA activity. During the course of the Forum, the moderators prepared weekly summaries of the discussion, in English and Spanish, and these will remain on the website. This paper, *Reflections on the ORCA Discussion Forum*, will be posted on that website and notification of the posting will be sent to everyone in the Directory. As previously stated, this paper is meant to provide insight into our thinking as we begin the process of revising the ORCA draft paper, which will be finalized in early March 2009. The final ORCA paper will be translated into the official languages of FAO. As the various language versions are completed, they will be posted on the Forum website.

In terms of ORCA implementation, we intend to identify current organic research cooperation that is on-going between Northern and Southern countries and help pool together existent but scattered organic networks. The aim of this work is to direct already allocated resources to a common project' objective, supported by co-funding and thereby a mass of invaluable knowledge, even in the absence of ORCA funding in this initial phase.

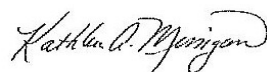
Such a meta-network will be established first for Africa. Because the needs are so vast in this continent, we hope that the first ORCA Centre will be based here. To this end, FAO staff are currently trying to better understand the degree to which African institutions and individuals are now involved in organic agriculture research. An upcoming conference provides great opportunity for us to improve our understanding and to engage interested constituencies in our ORCA work. The 1st African Organic Conference will be held on 19-22 May 2009, in Kampala, Uganda. We plan to attend to first present the ORCA concept to all conference participants as part of the formal conference programme and then to conduct an ORCA planning workshop to engage interested parties in more detailed discussion on ORCA implementation.

While our plans are still unfolding, one goal remains consistent: to make ORCA implementation as transparent and participatory as possible. This goal is consistent with the Forum effort, a worldwide and fully transparent consultation that allowed everyone the opportunity to engage in conversation about the future of organic agriculture research.

Our final reflection is that our work has been greatly improved by the Forum consultation, along with comments provided on a very preliminary draft shared amongst a small number of individuals. We appreciate the time and care people have devoted to ORCA and look forward to active partnership as we move forward.



Nadia El-Hage Scialabba
FAO



Kathleen A. Merrigan
Tufts University



Urs Niggli
FiBL