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U.S. Department of Agriculture AD-421 Progress Report U.S. Dept. of Agriculture, State Agricultural Experiment Stations and Other Institutions		Date (Month, Day, Year) 12/13/2009	
1. Accession	Agency Identification No.	5. Work Unit/Project No.	6. Status
0210964	2. CSREES 3. MONE	MONE-2007-02535 [Grant # 2007-38411-18609]	Progress
7. Title			
New Paradigm for Discovery-Based Learning: Implementing Bottom-up Development by Listening to Farmers' Needs and Using Participatory Process			
12. Investigator Name(s) (Last Name and Initials)			
Dunkel, F. V.; Montagne, C. A.			
20. Termination Date 09/14/2010		40. Period Covered (mo/da/year): 09/15/2008 to 09/14/2009	
Students Funded: 22		Faculty Hours Funded: 158	
41. Progress Report:			
<p>Six institutions of higher ed responded to 5 Malian villages/village clusters in intensive teaching/learning processes. Malaria diminished significantly through integrated approach in Sanambele, a Bambara farming village. Villagers, including village school, engaged 40 Montana State University (MT State) students, 2 faculty to provide long-distance listening, holistic ideas via Malian mentors. Village women's handicraft enterprise launched 2007 thrived, began microloan system. Malaria season 2009 had no deaths in Sanambele. Mosquito populations significantly decreased. President of MT State awarded President's Award for Service Learning to Sanambele and Dunkel et al. who initiated University Core course assisting Sanambele, PSPP 465R Health, Poverty, Agriculture: Concepts/Action Research. With disease-free, tissue culture-grown seed potatoes, Malian scientists filled request of Dogon village (Borko) to help start certified seed potato production in Mali. MBA students in University of St. Thomas (UST), St. Paul MN, action research course provided project management advice in storage, transportation, governance, quality control, marketing for Malian scientists working with Borko farmers. UST sociology students/faculty engaged Borko farmers in in-depth interviews determining village readiness for seed potatoes. Virginia Tech (VT) addressed diversification requests by analyzing pesticide-free status of honey/beeswax of Bambara farming village, Zantiebougou. Meanwhile, UST business/accountancy grad students helped Malian mentors create business plan with Zantiebougou women's shea/bee products cooperative. UST French students assisted UST students in village/mentor dialogues. Four Bozo-Fulani fishing villages, including Dangeuri-Maliki, in Niger River inland delta shared perceptions of water quality/water-borne disease transmission in 61 in-depth interviews with Cultural Geography grad student, Malian Environmental (hydraulic) Engineering professor. University of California (UC-Davis) Plant Pathology students/professor listened to Bambara farmers in Baguinda area describe tomato farming issues, worked with Malian plant pathologists at l'Institut d'Economie Rurale (IER) to address farmer needs for host-free period management and safe storage. UC-Riverside (UC-R) molecular entomologist collaborated with international economist to offer honors course exploring failed foreign aid/bottom-up solutions. Northern Cheyenne prepared to return to Mali to explore traditional values with other first people, Sanambele villagers. These 4 tribal college (CDKC) graduates initiated mentor system guiding MT State native/non-native students in discovering values of traditional ecological knowledge. Although 22 worked in Mali, 281 students at 8</p>			

institutions of higher ed engaged in participatory work with Malians about village issues. We accomplished this with 158 Malian faculty hours funded Year 2 by this grant for mentoring US students. US faculty provided 2,540 hours and Malian faculty provided 3,712 hours for a total cost share contribution Year 2 of 39 months at CDKC, MT State, VT, UC-Davis, UC-R, UST, U of MT, Agricultural University of Mali, and IER.

43. Publications

Anonymous. 2009. Action research links MSU with Mali. *Ag Excellence* 2008. College of Agriculture and MAES in Review. Montana State University. p. 16.

Curoso, Anthony. 2009. University of St. Thomas Projects in Mali. Student Conference on sustainability. University of St. Thomas, St. Paul MN. Attendance: approximately 165.

Dunkel, Florence V., Stefan Jaronski, Christopher Sedlak, Svenja Mieler, Kendra Veo. Effects of Steam-Distilled Shoot Extract of Mexican Marigold, *Tagetes minuta* (Asterales: Asteraceae), and Entomopathogenic Fungi on Larval *Tetanops myopaeformis* (Roder). *Environmental Entomology*. Submitted 11 Sept 2009.

Dunkel, Florence. 2009. Mali agriculture incubator: The marriage between post-graduate education and an agribusiness incubator. Invited presentation for World Bank BBL Series on Agricultural Innovation Systems. 11 March 2009. Washington D.C. 35 people present.

Dunkel, F.V. 2009. Dunkel invited to speak at World Bank. *Plant Science Says*. 12:5.

Dunkel, F.V. 2009. Food insects for school lunch programs. *Contemporary Issues in Science*. Public Debate by students of BIOL 106CS. Montana State University-Bozeman. April 26, 2009. video. 75 minutes.

Dunkel, F.V. 2009. Renchinlumbe Darhad Valley, Mongolia. Whole Community Wellness: Holistic Engagement by students of PSPP 465R. CD of public presentation of recommendations addressing holistic goals of nomadic herding community. 45 minutes.

Dunkel, F.V. 2009. Sanambele Mali: Addressing villagers request for help with village-based solutions to Hunger Period. Holistic Engagement by students of PSPP 465R. CD of public presentation of recommendations addressing holistic goals of Bambara farming community. 45 minutes.

Dunkel, F.V. 2009. Flat Stanley visits Sanambele, Mali. Storybook with 300 photos for third graders required to study Mali in state of Virginia. 50pp. Dunkel, F.V. and W. Nickisch. 2009. Facilitating integrated malaria management in a Bambara farming village by villagers, for villagers. USDA trip report. 12 to 27 March 2009. 31 pages.

Dunkel, F.V., Shams, A.N., C.M. George. *Expansive Collaboration: An Innovative Service-Learning Model to Address Bottom-Up Development*. Poster presented 7 June 2009 to the national meeting of USDA SERD and NACTA meetings, Stillwater, OK..

Dunkel, F.V. 2009. Lessons learned in Rwanda. Presentation for Social Studies students at Belgrade Middle School, 8th grade. 150 students.

Dunkel, F.V. and Tiphani Lynn, eds. 2009. *Anthology of the Issues of Insects and Human Societies*. Montana State University-Bozeman. 330 pp.

DeFoliart, Gene, Florence Dunkel, David Gracer. 2009. *The Food Insects Newsletter: Chronicle of a Changing Future*. Aardvark Global Publishing. Big Sandy, Utah. 414 pp.

George, Camille M. 2008. *Minnesota Campus Compact: Civic Engagement Forum on Environmental Sustainability*. Minnesota conference. November 10th, 2008, College of St. Catherine, St. Paul, MN. Attendance 150.

Gilbertson, R.L., Margaret. Lloyd, Alysa Anderson. 2009. Internet based diagnostics: Plant disease diagnosis in Mali. Presentation at regional IPDN Workshop. Attendance 39.

Kante, A., F.V. Dunkel, A. Williams, S. Magro, H. Sissako, A. Camara, M. Kieta. 2009. *Communicating agricultural and*

- health-related information in low literacy communities: A case study of villagers served by the Bougoula Commune in Mali. Presentation at Annual meetings Association for International Agricultural and extension Education. San Juan, Puerto Rico.
- Lynn, Tiphani, F.V. Dunkel, David Sands, Keriba Coulibaly, Hawa Coulibaly. 2009. Phytochemical considerations for the use of local, traditional plants for the integrated management of malaria in the farming village of Sanambebe, Mali. Poster presented at Montana State University Undergraduate Scholars Conference, April 14, 2009. Attendance 300.
- Minor, Nathaniel and Luis Rangel. 2009. Agricultural Development in Borko, Mali: Projecting Village Impacts. Session 89. Undergraduate Research Poster Session. University of St. Thomas Attendance. approximately 50 (plus 30 students from 16 different schools who were presenting also viewed the posters)
- Nickisch, Wendy, Florence.V. Dunkel, Ada Giusti, Hawa Coulibaly. 2009. Sustainability in Sanambebe: Integrated malaria management through development of a more efficient handicraft enterprise in a Bambara farming village. Poster presentation. Montana State University Student Research Celebration. April 14, 2009. Attendance 300.
- Powers-Peprah, Pauline, F.V. Dunkel, Ada Giusti, and Keriba Coulibaly. 2009. Introductory study of womens roles in holistic management of malaria in an isolated, traditional subsistence farming village in Mali. Poster presented at Montana State University Undergraduate Scholars Conference, April 14, 2009. Attendance 300.
- Powers-Peprah, Pauline, F.V. Dunkel. 2009. Introductory study of womens roles in holistic management of malaria in an isolated, traditional subsistence farming village in Mali. presented 17 June 2009 to the national meeting of USDA SERD and NACTA meetings, Stillwater, OK. Attendance 100.
- Saly, P. Jane and Ashley Shams. 2009. Accountancy and French students working with the Zantiebouyou, Mali Coprakazan Cooperative. Trip report.
- Shams, A.N., C.M. George, and F.V Dunkel. Expansive Collaboration: An Innovative Service-Learning Model to Address Bottom-Up Development. submitted July 15th, 2009 to the International Journal of Teaching and Learning in Higher Education. In journal review.
- Smith-Cunnien, Susan. 2009. Are the Farmers of Borko ready for a certified, disease-free seed potato program: in-depth interviews and focus group analysis. Midwest Sociological Society. Annual Meeting, April 2-5, Des Moines, Iowa.
- Smith-Cunnien, Susan. 2009. Sociology Students as Part of an Interdisciplinary Agricultural Project Team in Mali, West Africa. Session 93. (Roundtable) Integrating Service Learning and Study Abroad into the Classroom. Undergraduate Research Symposium. University of St. Thomas. Attendance: 10
- Smith-Cunnien, Susan. 2009. Students and faculty J-Term Mali adventure. Soc Notes, Spring 2009. pp. 16-17.
- Smith-Cunnien, Susan and Ashley Shams. 2009. In-Depth Interviews and Focus Groups in Borko addressing the initiation of a certified disease-free seed potatoes. Sociology and French students. Borko trip report.
- Said, Bashe. 2008. Mali Night at the University of St. Thomas (Connecting U.S. students to Mali). he Africa News Journal, November 14th, 2008.
- Minor, Nathan. 2009. It starts with a seed: St. Thomas helps a Mali village prepare for a ripe future. The St. Thomas Magazine, Spring 2008, pp. 38-41.
- Minor, Nathan. 2009. St. Thomas joins relief efforts in Mali. The Aquin, February 27, 2009. p. 15.
- Owens, Ernest. 2009. Project Management Business team trip report. MGMT 714. University of St. Thomas. January 2009.

Products

During Year 2, students completed about 42 projects in collaboration with and suggested by the 5 villages/village clusters. These included MT State student, Pauline Powers-Peprah who did 60 in-depth interviews with Sanambelean women of child-bearing age who took care of one or more children 0-5 years of age, the most vulnerable stage for fatalities due to cerebral malaria. Ashley Williams conducted a study entitled, Water quality and waterborne disease along the Niger River,

Mali: A study of local knowledge and response. This resulted in a journal manuscript that will be submitted to Health and Place in Year 3. Both of these students did their publishable research unaccompanied by US faculty and were in Mali mentored by the Malian faculty. VTech students/faculty collaborated with Malian villagers and the Mali mentor team on 4 projects: identifying the value chain for honey and beeswax; evaluating products generated by beekeeping practices; grafting of tomatoes to eggplant rootstock for resistance to bacterial wilt; and studies on the comparative genomics of the 2La chromosomal inversion breakpoint in *Anopheles gambiae*. Chief Dull Knife students who will leave for Sanambele the first day of Year 3 are prepared to: follow-up P. Powers-Peprah work on emergency strategies for cerebral malaria in young children; follow-up on her previous studies in Sanambele with the use of cowpeas to provide complete proteins for children; and to explore use of storytelling by the elders in the new village preschool. Four students at UC-R prepared to work in Sanambele following up on the malaria dry season mosquito management and entrepreneurial activities. Due to illness of the leader, this trip was cancelled. Most importantly, non-native students close to 300 students who did not travel to Mali, gained amazing insights in learning how to not be a planner, how to not direct any action in the village, to simply be quiet and listen. Students learned by role-playing how to think in another role, how to climb out of ethno-centric thinking and to appreciate other cultures on an equal basis. Students learned the dangers of development, the slippery slope of what happens when you do not learn to speak in your native tongue. All of these lessons, whether an aggie or an engineer, a linguist, a historian, an artist, a molecular biologist, or a geneticist, are essential and urgent to learn. Students know this and are flocking to these courses. This is by far the most important product, a new and needed awareness among younger generations.

Outcomes

Mentor visits of two Malian Institute of Agriculture (IPR/IFRA) professors Sidy Ba and Belco Tamboura were made to the US for a total of 3 months. Students and faculty at UST, VTech, MT State, University of MT, and UC-R benefitted from the visit. Having mentors interacting in the classroom is invaluable. As a result of the cultural geography collaboration with engineering in our project, we are now involving a new institution, the University of Montana. Dr. Sarah Halvorson serves as the co-advisor with Dunkel for Ashley Williams, the first graduate student to do her thesis on a Mali village issue. Four syllabi at UST were developed and courses taught based on agricultural issues with participatory, holistic approaches. These were: SOCI 498 Mali Development; FREN 496 Introduction to Malian civilization; MGMT 714 Applied Strategic Planning; MGMT 623 Strategic Business Plan Development. As part of the course, students assisted their 6 Malian mentors in developing a business plan for their non-profit incubator in the process of forming. Four initiatives were decided on by the Malians and completed: evaporative cooler plan; honey and beeswax plan; shea butter plan; and seed potato plan. UST Academic review committee on International Education accepted the J-term interdisciplinary course in Mali for 2009. Dr. Shams was nominated for Global Citizenship award and Dr. Dunkel received the MT State President's award for engaging a community partner in service learning experience for students. Fifty faculty meetings were held by conference call, a mini-workshop (virtual) on shea butter at all institutions was held. VTech students presented their research summaries to faculty from all institutions via Skype. Skype became a useful tool for interacting with particularly the leader of the Mali Agri-Business Center, our Mali mentor team, Belco Tamboura. The holistic approach to teaching and interacting with villages is now being taught at the Agricultural University in Mali by Tamboura in a form of action research, part of the Quiet Revolution. Mechanical engineering professor, Dr. George, visited MT State Plant Pathology and the Montana Seed Potato Lab and well as seed potato farmers in MT to learn the details of seed potato production to help her convey the microbiological constraints and storage requirements for safe seed potato storage. Thus, with a clear understanding of the needs of the village community and with the direction for action being given by villagers, not by professors or students.

Dissemination Activities

We began to more broadly disseminate our Quiet Revolution, i.e., learning to listen to villagers needs and facilitating bottom up solutions using participatory, holistic process, in three basic ways. Dunkel accepted a World Bank Washington D.C. invitation to share the team's 'marriage model.' The Bank's goal was to be more effective in launching sustainable projects and found our model of marrying an agribusiness incubator (the Mali Agri-Business Center [Mali ABC]) to university faculty) unique. Indeed, the Mali ABC has a chance to survive because it forms an important, an essential part of our mentor system for US students/faculty while receiving from us unlimited assistance/advice in working toward their holistic goals. The PBS-bound film 60-minute, *Dancing Across the Gap: Scientific Knowledge and Cultural Wealth* was in its 3rd and final filming as Year 2 ended. As a result, Northern Cheyenne are engaged in strengthening their own cultural identity while learning to know a community (Sanambele) that did not have its language and other parts of its culture stripped from them in a forced assimilation. Cheyenne are beginning to see how important their role is in helping Sanambele understand the high cultural cost of assimilation. Creating real life opportunities to learn from communities of first peoples, such as these is the goal of the national symposium approved in Year 2 for presentation December 15, 2009 in Year 3. The project team from Mali, VA, MN, CA will present *The Quiet Revolution: Facilitating International, Holistic, Service-Learning on Toxicologic, Physiologic Issues* at the Indianapolis Convention Center in conjunction with the national meetings of the Entomological Society of America.

Future Initiatives

We will complete PBS-bound film, Dancing Across the Gap and submit to PBS after grand opening at MT State and CDKC/Northern Cheyenne Reservation. Now that malaria seems to be on the wane in Sanambebe, we will address their other urgent concerns such as the hunger/kwashiorkor issue in Sanambebe. We will be following up on the unsettling information shared with us in September 2009 that grasshoppers, a common snack for children which probably abated kwashiorkor, are now being discouraged by parents and elders concerned about the high pesticides in neighboring cotton fields. Northern Cheyenne mentors will travel to Sanambebe and work with students in action research class at MT State via e-mail and in person. We will provide World Bank-Washington with requested position paper on the agriculture incubator that we developed with Malians. We will continue to work with the Sanambebe Women's Association and their handicraft enterprise, help them market their creative products in Bozeman, with continual evaluation of any negative cultural outcomes. We will engage Northern Cheyenne students on MT State campus in Lame Deer and at CDKC in dialogue with MSU non-native students. The Quiet Revolution Symposium at Convention Center Indianapolis IN supported by Integrative Insect Physiology and Molecular Biology, Toxicology will be held and video taped for broader distribution. We will follow up with a how-to book useful for those beginning a quiet revolution on their campus and in any organization such as Pennies for Peace. UST will bring a team of French, accountancy, sociology, and engineering students to interact with Borko, Mali farmers just beginning their first season of certified, disease free seed potato production. UC-R professor Dr. Beckage will teach a Washington term in Washington D.C. incorporating the universal truths/observations of the 12 author groups, e.g., Ayittey, Savory, Mortensen, Dettwyler, Easterly, Calderisi, Norberg-Hodge, Amadou Hampate Ba, Chambers et al., that we use in our action research courses developed as a result of this grant. We will extend teaching and learning ideas of the Quiet Revolution to the IPM CRSP and other CRSP programs. We will use more Native American readings in the course. We will continue to evaluate impact using the IDI, an instrument measuring ethnocentric/ethnorelative views and a service learning instrument developed by the UST team.

Impacts

Students/faculty at MT State are beginning to understand the importance of language in culture and the high cost of loss of cultural identity and to be ever more cautious of the cultural footprint they and others make in collaborating with any first people. The Action Research course PSPP 465R developed as a result of this grant at MT State is part of the required University Research Core courses and is now offered every semester. The course fills each semester early in the preregistration period. The Northern Cheyenne community and tribal college, Chief Dull Knife College is engaged with the MT State students in the action research course (PSPP 465R). Cheyenne and Crow students at MT State both take the course and mentor non-native students in understanding their history and cultural identity issues. Nine Villages, a non-profit charity was spun off from the grant in a partnership between MT State/U of Mali faculty and Fulani villages in Mali to improve basic human needs of nutrition, health, education. UST has connected students/faculty with the Malian community in Minnesota. Mali Nights (an evening of cultural sharing) are now held twice a year on the UST campus. UST has connected increasingly diverse disciplines on campus, focused on responding to village requests for help via the Mali Agri-Business Center, an incubator made up of Malian university faculty and agricultural scientists. Students/faculty/villagers seem to have developed a simple, effective, sustainable way of managing malaria in sub-Saharan Africa

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