

Research Opportunities at CIAT for M.Sc. and Ph.D. Students

(20Aug04; www.ciat.cgiar.org; e.hesse@cgiar.org)

	<i>Agrobiodiversity</i>	<i>Learning to Innovate</i>	<i>Land Degradation</i>
Agronomy	<ul style="list-style-type: none"> • Genetic correlations among key traits for a scientifically based Selection Index • Evaluation of genotype by environment interactions in cassava • Establishment procedures for the tropical legume shrub <i>Cratylia argentea</i> • Floral biology of the tropical amphicarpic legume <i>Centrosema rotundifolium</i> • Morphological and agronomic characterization of a germplasm collection of a selected tropical legume • Patterns of genetic diversity in cultivated plans of the Neotropics, according to human factors (domestication, farmers' management, role of gender), past and current 	<ul style="list-style-type: none"> • Approaches for reducing and post-harvest physiological deterioration (PPD) • Evaluation of nutritional quality of cassava roots for Fe and Zn • Valuation of nutritional quality of cassava roots for proteins 	
Conservation	<p>Procedures for:</p> <ul style="list-style-type: none"> • Identification of germplasm entries, separation of duplicates, and definition of core collections • Characterization and agronomic evaluation of germplasm for the user • Control of genetic contamination and drift in preserved populations • Multiplication and processing of Neotropical germplasm species; definition of orthodox and intermediate seed behaviour species • Cryoconservation of tropical orthodox seed species • Verifying the optimum viability of preserved seeds, classic procedures and non destructive tests • Preserving <i>in vitro</i> germplasm of Neotropical species, over short- and long-term • Cryoconservation of meristems of Neotropical species • Integrating <i>in vitro</i> conservation collections and field genebank • Integrating <i>ex situ</i> conservation with on-farm management, including cost analysis 	<ul style="list-style-type: none"> • Computing techniques for germplasm bank managing, seed collections, in vitro and living collections • Design, compilation and organization of information through databases and expert systems 	

Water management		<ul style="list-style-type: none"> Managing social and environmental impacts of farm and watershed-level interventions Managing trade-offs and conflicts in Natural Resource Management (NRM) 	<ul style="list-style-type: none"> Generation of water in cloud forests located in upper catchments Sustainable use of water for guadua production in downstream riparian areas, Economic and environmental management of riparian guadua Exploration of potential options for impact such as drip irrigation, demand control and water harvesting.
Plant Physiology, Breeding	<ul style="list-style-type: none"> Physiological studies related to drought tolerance in cassava Inbreeding depression in cassava Development of a protocol for the production of doubled-haploids in cassava Vegetative propagation of the tropical legume shrub <i>Flemingia macrophyll</i> Genetic variability in natural populations according to their reproductive systems: gene flow, natural allogamy, apomixis, and environmental factors that influence them BGMV resistance for improved lines in the Americas Development of germplasm nurseries with potential donors of resistance to different rice pathogens Identification of new blast resistance genes in wild species of rice and unutilized germplasm within <i>Oryza sativa</i> 	<ul style="list-style-type: none"> Application of molecular markers in cassava breeding Implementation of a tilling system for detecting useful starch mutants Control over the flowering habits of cassava Breeding for higher yielding climbers adapted to lower elevations Diffusion of new bean varieties in Latin America through associations of farmer organizations 	
Agro-Business	<ul style="list-style-type: none"> <i>In-vitro</i> evaluation of grass and legume species conserved as hay and silage 	<ul style="list-style-type: none"> Influence of market opportunity in the willingness to experiment on technologies Approaches for reducing post-harvest physiological deterioration (PPD) Participatory evaluation of the utility of hay and silage for smallholders Milk yields of cows supplemented with selected forages conserved as hay and silage in plastic bags Community enterprise development process to reach the women and marginalized members of the community Minimal resources needed to participate in community enterprise projects Enterprise development to empower women Implications of the project intra-household dynamics, whose voices dominate in the selection of enterprises, and technology development processes 	<ul style="list-style-type: none"> Fostering “Win-Win” Market – Natural Resource Management Linkages Motivation of improved natural resources management strategies through closer farmer-market linkages Farmer investment in NRM through enterprise development Community enterprise development leading to further soil mining and vice versa

Spatial analyses	<ul style="list-style-type: none"> Evaluation of genotype, product quality by environment interactions in coffee Evaluation of genotype by environment interactions in cassava Morphological and agronomic characterization of a germplasm collection of a selected tropical legume Patterns of genetic diversity in Neotropical cultivated plants and wild relatives according to geographic, ecological, and climatic gradients 	<ul style="list-style-type: none"> Analyses of high resolution low altitude aerial images to improve participatory on-farm experiments Developing weather-based crop insurance concepts Dynamic conservation of natural parks <i>in situ</i> and compilation of germplasm for conservation <i>ex-situ</i> Identification of areas and essential parameters for <i>in situ</i> conservation 	<ul style="list-style-type: none"> Identification of environmentally and socially sensitive areas within an integrated watershed management context. Analyses of long-term vegetation satellite imagery to improve water management in upper catchments
Plant protection	<ul style="list-style-type: none"> Identification of resistance to pests from wild relatives of cassava. Host resistance incorporated in elite cassava genotypes. Genetic variability in pathogens and pests associated with Neotropical cultivated plants and their wild relatives (co-evolution) Development and deployment of IPM systems for management of whiteflies and thrips affecting beans and snap beans Bean root rot disease management in Uganda (NEW) Identify molecular markers associated to tolerance to sheath blight Evaluation of genetically modified cassava on the development and survival of the cassava hornworm <i>Erynnis ello</i> Identification and evaluation of homoptera species as possible vectors of cassava Frogskin Disease (CFSD) 	<ul style="list-style-type: none"> Increased use and sustainability of plant resistance to diseases Cassava roots with high levels of iron and resistance to Root Rot Biological control of white flies Development and formulation of biological pesticides for integrated pest management in cassava 	

<p style="text-align: center;">Participatory analyses</p>		<ul style="list-style-type: none"> • Minimal designs of on-farm experimentation to foster innovation • Functional adaptation of farmer experimentation from pilot sites to new sites • Factors influencing the partnership processes • Benefit/costs of maintaining partnerships • Integration of decision support tools, simulation modeling, and optimization models, to develop improved productivity management options with farmers • Information and technical support needed by small-scale producers to make well informed decisions • Role played by community-based participatory monitoring and evaluation systems in empowering communities, strengthening group organization, and improving information processes for better decision-making • Enabling Rural Innovation framework as an effective mechanism for reaching women and the poor 	<ul style="list-style-type: none"> • Strengthening of the local capacity in integrated watershed management science through the involvement of local youth in water research • Indigenous technical knowledge for sustainable land management
--	--	---	---