

INTERNATIONAL COUNCIL FOR RESEARCH IN AGROFORESTRY

(ICRAF)

Collaborative and Training Programs

Agroforestry Research Network

for Africa

(AFRENA)

- Sub-humid Bimodal Highlands Zone -

Unsolicited Proposal

from ICRAF

- PRESENTED TO USAID/S&T/FENR -

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EXECUTIVE SUMMARY

In the highlands of East and Central Africa, the need to feed a rapidly burgeoning population has led to widespread natural resource deterioration. Traditional forms of agriculture are no longer adequate to meet food production requirements and maintain environmental stability on which agricultural productivity rests.

Under these circumstances, the agroforestry approach of incorporating woody perennials into existing farming systems constitutes a sound practice, given the potential of trees to produce food or fodder in combination with fuel or timber, as well as to protect soils, and even restore soil fertility.

The scarcity of knowledge on existing and potential agroforestry technologies stems from the relatively recent "re-discovery" of agroforestry, and the corresponding lack of institutional capabilities to confront pressing land use problems requiring an innovative approach.

Furthermore the seed that is available for use in agroforestry is either scarce for various species, and for other species the quality and source of seed is dubious.

The research undertaken in this project is aimed at improving species/agroforestry technologies with a selected number of species, and to produce seed from superior trees based on selection criteria developed for each tree species.

The process involved in conducting research for MPT species selected in this project is viewed as a continuum, and the amount of time required to achieve results for a particular species is dependent upon the amount of information available for that species.

The multidisciplinary nature of research on the agroforestry approach to land use requires the combined use of resources available in institutions from the agriculture and forestry sectors. Networking is the appropriate operational model to bring together these various disciplines, given its flexible nature and potential for using available resources in a complementary fashion.

The project is to be conducted under a 5-year cooperative agreement with an evaluation occurring in the third year. The expected outputs at the end of the 5-year period are:

- a. Four agroforestry ^{Technical Groups} ~~Coordinating Committees/Mechanisms~~ (one per country) trained in agroforestry research;
- b. A master plan for network development;
- c. Establishment of MPT species/agroforestry technology network in up to four countries;

- d. Increased production of genetically improved seed for 5-10 selected MPT species;
- e. Identification of location or country specific agroforestry research problems.

In accomplishing these outputs, collaborative efforts are envisaged with other donors (e.g., GTZ, IBRD, IDRC, CTFT, the Swiss Development Corporation, etc.) to enhance the production of improved seed, and with CGIAR institutions (ILCA, ICRISAT, and IITA) to develop agroforestry technologies.

I. Goal:

To improve sustainable agricultural productivity through greater adoption of agroforestry technologies compatible with local land-use conditions thereby increasing national capability for food self-sufficiency in Africa.

II. Purpose:

To promote better land-use applications by developing national capability to put in place appropriate agroforestry technologies as part of a pragmatic integration of agriculture and forestry.

III. Objectives:

- A. To compile and disseminate information on the needs, actions and potential for agroforestry in the sub-humid, bi-modal highlands of East and central Africa.
- B. To assist in the development, establishment and coordination of agroforestry research network in the ecozone focusing on agroforestry technology, multipurpose tree species and tree improvement trials.
- C. To collaborate with and support national and international research institutions in the ecozone in the conduct of agroforestry technology, multipurpose tree species adaptation and tree improvement trials.
- D. To assist national and international institutions and agencies in the choice and acquisition of quality seed for multipurpose tree species as components for agroforestry research efforts.
- E. To assist national institutions in strengthening the capability of their personnel resources to evaluate land use systems and apply agroforestry technologies to overcome identified constraints and improve productivity and sustainability.
- F. To facilitate consulting services and advice for agroforestry in LDCs.

IV. Outputs:

The expected outputs of this project will accrue throughout the five-year life of project in five categories:

A. Four Agroforestry Technical Groups (one per country) trained in agroforestry analysis of land-use problems, *and* agroforestry research design and implementation with the latter emphasizing species and technology trials.

B. A Master Plan for agroforestry network development including:

1. preparation of a hard copy state-of-the-art report on agroforestry development for each country.
2. preparation of an ecozone-wide agroforestry assessment.
3. preparation of a prioritized plan for agroforestry research actions.

C. Establishment of high priority agroforestry technology trials with selected multipurpose tree species and in up to four countries in the ecozone.

D. Tree improvement trials leading to the eventual increased production of genetically superior multipurpose tree seed for identified agroforestry technologies.

E. Identification and prioritization of location or country specific agroforestry research problems.

V. Activities:

A. MASTER PLAN FOR NETWORK DEVELOPMENT

This activity will involve integrated planning and analysis among national institutions, and will analyze prevailing land-use systems in the ecozone to provide elements for decisions on the focus of agroforestry research and to propose organizational structures to conduct the research. Master plan development, leading to research implementation and network development will be undertaken according to the following approach:

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1. Mobilization, Promotion, Organization and Information Gathering

This activity will be guided by ICRAF specialists, assisted by the Data Appraisal Team for Africa (DATA, constituted by junior scientists recruited and supported through an IDRC funded project.) and will include the early participation of the Zonal Coordinator. This team will be charged with:

- a. Identification of participating national institutions from the agriculture and forestry sectors.
- b. Developing the organizational framework for multi-institutional cooperation in the planning and implementing of agroforestry research projects within each country, including the designation of national coordinating committees/mechanisms.
- c. Defining objectives, structure, and operational procedures for a zonal agroforestry research network.
- d. collecting and analyzing secondary information on land use systems (LUS) in the ecozone.
- e. selection and development of a training module for the Land Use Systems Analysis Training.

2. Introduction to Agroforestry networking and training in LUS analysis.

This activity will be carried out using the module developed above with the participation of all National Technical Group members from the four countries (15-20 scientists) employing study materials developed by ICRAF's multidisciplinary team.

The seminar will focus on the application of ICRAF's Diagnostic and Design Methodology. Country representatives in the ecozone are expected to participate in all steps of research planning: pre-diagnostic data evaluation, field diagnoses, "ex-ante" design and evaluation of alternative agroforestry technologies, and project formulation.

3. Country-specific Land Use Systems Analyses

Further in-country analysis of existing LUS will be undertaken by the members of the National Technical Group in each country with periodic backstopping by ICRAF's Core Staff and the Zonal Coordinator. This activity will result in the preparation of a hard copy state-of-the-art reports on agroforestry for each country which will include:

- (a) identification and mapping of the major environmental regions of the country.
- (b) quantitative description of the major land-use systems of each region, including their extent.
- (c) identification and quantification of the nature and severity of problems faced by these land-use systems, including both problems of the farmer (or other land user) and problems of the environment.
- (d) quantitative description of existing agroforestry systems and practices, traditional and modern, to be found in the country.
- (e) summarize the present state of the capacity for agroforestry research in the country, including:
 - research stations and their environmental conditions
 - details of current research, and
 - principal results obtained.

B. RESEARCH NETWORK DESIGN AND IMPLEMENTATION

1. Priorities identification workshop

This workshop will be held in Nairobi with the participation of all Technical Group from the four countries. Under ICRAF guidance, country-specific LUS analyses will be discussed; common problems and proposed agroforestry interventions will be identified and prioritized. Research priorities will be determined in accordance first, with their importance at the national level, and second, by their regional significance. The end result will be an ecozone wide action plan encompassing:

- (a) selection of ecozone significant agroforestry technologies and target species to be used in testing the technologies.
- (b) an additional list of location or country specific research actions.
- (c) preliminary discussion of selection guidelines for superior seed trees.

2. Research design and methodology training by country.

Using materials developed by ICRAF, National Committees will be trained in research design methodologies to be used to address problems and suggested agroforestry interventions identified above. Research design workshops will be held in each country sequentially depending on the level of each country's mobilization capability. Specific topics will include:

- a. development of a comparative testing and research design methodology compatible with international standards which may be employed for establishing trials and perhaps to rationalize on-going or existing trials.
- b. Development of seed collection and handling protocol for species in the following four categories:
 - locally utilized well known species (e.g., Grevillea spp., Maecosopsis spp.)
 - locally utilized little known species (e.g., Erythrina spp., Calliandra spp.)
 - unknown exotic species with excellent potential (e.g., high altitude Leucaena spp.)
 - unknown native species with excellent potential (e.g., Albizia spp., Polycias spp., Markhamia spp.)

Protocols will be implemented according to the indicative plan found in Annex

3. Research mobilization

In collaboration with local institutions, ICRAF will conduct visits to the respective countries in order to:

- a. engage required manpower resources, initiate commodity procurement and make selection of sites;
- b. verify existence and availability of nursery sites and seed storage facilities;
- c. development selection criteria for superior seed trees;
- d. initiate seed collection/procurement.

4. Research Implementation

The experimental phase of the species-specific and technology specific research trials will be carried out by the ICRAF recruited agroforestry research manager and the national committee implementation teams utilizing the operational funds earmarked under the project budget. Technology-specific projects will be of a multi-station type with some on-farm testing in collaboration with national and international programs. The location or country specific projects will be conducted on-farm.

The following three pronged approach is recommended for conducting agroforestry research consisting of:

- a. the selection of promising agroforestry technologies for identified priority land-use problems based on an evaluation of their adaptability to local farming systems..
 - Consideration of appropriate management and/or cultural techniques based on an assessment of farmer preferences for both crop and tree outputs.
 - The collection of yield data and information on interactions among crops and trees in the agroforestry systems will be used to revise agroforestry configurations and provide parameters for assessing the performance of agroforestry tree crop combinations.
- b. The choice of species/provenances of indigenous or well adapted exotic species to be tested in agroforestry configurations identified above.
 - Selection of seed trees from within provenances of indigenous species or well-adapted exotic trees based on selection criteria geared to compatibility with agroforestry applications.

- Corroboration and/or applied research on seed handling and nursery techniques for seedling production should be conducted to enable successful planting of these tree species.
- c. Basic research with promising species involving:
- procurement of seed of the desired tree species; formulation of experimental designs(s) needed for conducting and evaluating field trials.
 - establishment of species/site trials; maintenance of field plots and collection of data that is subsequently analyzed under ICRAF guidance.
 - Outstanding species can be incorporated into the operational seed orchard program, or species/provenance trials can be started for additional testing of promising provenances before incorporating them into the production/applied phase of such a program.
 - Management trials. (e.g. coppicing, to be conducted in the future.

The advantage of this ^{approach} is that planting programs with known species can be initiated immediately, thereby making it possible to address pressing planting needs. This also contributes to research for the improvement and/or development of nursery techniques and cropping methods needed for enhancing production. Basic research conducted to identify new species and initiate tree improvement work makes it possible to further increase productivity of agroforestry plantings.

C. IMPROVED SEED SUPPLIES

Criteria developed per the above for selecting the best species, the best provenances, within species and superior trees within a provenance will lay the groundwork for eventual large scale improved seed production. Work will be initiated which will lead to the establishment of seed orchards aimed at producing genetically improved seed. In some cases this can be done by simply converting adequately designed species trial plots into seedling seed orchards or establishing grafted seed orchards. Having developed criteria for particularly promising agroforestry species, funding is envisaged for complementing known on-going national/donor seed improvement/seed production efforts (e.g. GTZ/KARI, Swiss/Butare, CTFT/Burundi).

D. INSTITUTIONAL DEVELOPMENT

1. Establishment of coordination mechanism

In order for the envisaged concerted cooperation to become functional, there is a need to develop institutional "niches" that advance such an objective within and among countries, as well as between countries and external agencies. As mentioned before agroforestry research requires structures that promote joint efforts by institutions from the agricultural and forestry sectors for integrated planning and pursuit of common goals.

To satisfy such a principle, it is foreseen that concerted co-operation could be achieved by some kind of National Mechanism committee constituted by representation from government organizations from both the agriculture and forestry sectors dealing with research, extension, development, and training. In each country, the Technical Group will be responsible for setting up and implementing an agroforestry research plan and should preferably be given the authority to allocate funds that encourage complementary and co-operative research projects to be implemented by member institutions. Networking among countries within the ecological zone will be achieved through project sponsored zonal meetings composed of representatives from the different National Committees, that will essentially pursue the development of a zonal programme for co-operation on agroforestry research.

Networking among the national institutions will serve to enhance the exchange of information thereby strengthening the learning and development process fundamental to achieving material capability for agroforestry research and development.

2. Personnel Development:

As part and parcel of the institutional development process, the project will focus part of its resources on training host country personnel in various aspects of agroforestry research and development.

Training of national cadres will be systematically coordinated with processes leading to the design and implementation of agroforestry research efforts. It should be emphasized that as project implementation activities are initiated, personnel development will evolve from training on research planning to training on experimental methods and field research techniques for agroforestry. Much of the training will be accomplished as national staff implement project activities in close association with the zonal coordinator, the research manager and ICRAF personnel. More specifically, however, at least four training modules on key topics are planned for the full project audience. These are:

- a. land-use problem diagnosis and analysis of agroforestry applications;
- b. agroforestry research priority identification and experimental design; and,
- c. case study-application of analytical tools at a real problem site;
- d. multipurpose tree species selection for improved seed production.

E. MULTIPURPOSE TREE DATA BASE OPERATIONS

This project will make use of the present ICRAF sponsored MPT data base both for accessing required species information and storing the additional information generated in the course of research implementation. As a global data base is currently being developed under this project's parent project (F/FRED), every effort will be made to achieve compatibility of data bases (e.g., coordination, standardized descriptors and software interchangability).

INPUTS

1. The principal AID - supplied input is US \$3.6 million, provided through a cooperative agreement, obligated in FY 1986 and expanded by ICRAF during CYs 1986-1990. The source of those funds will be the Africa component of the Forestry/Fuelwood Research and Development project (F/F RED) plus additional funds acquired in AID/W.
2. Recruitment of a zonal coordinator with expertise in coordinate development of the Master Plan, serve as the agroforestry tree breeding who will primary liaison between ICRAF and selected host country institutions for the purpose of developing and assuring the functioning of the agroforestry network. The person will also develop and assist in on-the-ground implementation of species/agroforestry technologies research in four countries within the bimodal highlands. In addition, the individual will function as the primary contact with other zonal networks contemplated under the ICRAF Agroforestry Networking in Africa master plan.
3. The research manager will oversee the design and development of the species specific and technology specific research in the bimodal highlands zone. This person will organize and implement the various training sessions for the agroforestry teams from each of four countries, and he will oversee the establishment, maintenance and evaluation of on-the-ground research conducted in each country.
4. ICRAF core staff will be relied upon to provide assistance in developing the master plan, establishing the networks, conducting training sessions, designing research trials, and providing specialized technical assistance to the zonal coordinator and the research manager whenever necessary.
5. The project budget ~~of~~ details funds which will be provided for operational costs (i.e. staff, training courses, networking), plus the commodities needed to conduct this research in each country (i.e. vehicles, tools, research establishment and ma

6. Various project design exercises and a design workshop will be held to develop research proposals.
7. Evaluations of the project will be conducted by specially formed teams at the end of the third year. Depending on results of this evaluation, the project may be modified. A final evaluation should be conducted at the end of the fifth year when the project is completed.

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BUDGET

Inputs/Activities (Network Startup & Implementation)

1) ICRAF Program Coordinators	50	50	30	20	10
2) Zonal Coordinator	100	100	100	100	100
3) Mobilization/Organizational Country Visits	25				
4) AF Networking and LUS Analysis Workshop	40.55				
5) Country-specific Land-use Analysis	11.2				
6) Priorities Identification Workshop	40.55				
7) Training Course-Multipurpose Tree Species Selection			50		
8) Network Strengthening-in-country operational costs		40	40	40	40
9) Information Exchange- reports and publications	20	20	20	20	20
10) Annual Network Meeting		20	20	20	20
SUBTOTAL	287.3	230.0	260.0	200.0	190.0
11) Research Implementation					
-Operational Costs	152.9	152.9	152.9	152.9	152.9
-Collaboration			100.0	100.0	100.0
-Commodities	158.6	34.85	34.85	109.85	34.85
12) Evaluations			11.		12.
SUBTOTAL	598.8	417.75	558.75	562.75	477.75
13) Inflation (5%/yr)---		20.89	57.27	88.70	102.96
SUBTOTAL	598.8	438.64	616.02	651.45	587.70
14) Overhead (27%)	161.68	118.43	166.32	175.89	156.79
TOTALS	760.48	557.07	782.34	827.34	737.50
GRAND TOTAL					

\$3,664,730.*

*This overall grand total may be adjusted downwards to take into account phasing in of both countries and activities, e.g. points of adjustment

-employment date-research manager
-participation in all facets of the project by Uganda.

Budget Notes

- 1) ICRAF Program Coordinators
- 2) Zonal Coordinator - includes salary, fringe benefits, travel and per diem
- 3) Mobilization/Organizational Country Visits - a 2 week mission to each of the four countries of the zone to include the zonal coordinator, one ICRAF staff member and participation by host countries nationals.
- 4) Agroforestry networking and LUS Analysis Training Workshop:
(2 weeks in Kenya)
Travel: 4 persons x 4 countries x \$500 = \$ 8,000.
per diem: 4 persons x 4 countries x 14 x \$75 = 16,800.
ICRAF staff - 20 working days
@ \$350/day = \$ 7,000.
Interpreters 20 working days
@ \$250/day = \$ 5,000.
Report preparation: Zonal
Coordinator + 5 days ICRAF
staff = \$ 1,750.
Translation \$20 page x 100 pages = \$ 2,000.
\$ 40,550.
- 5) Country-Specific LUS Analysis:
including: Zonal Coordinator and 4 participants x 2 weeks in-country
travel (per diem) @ \$50/day x 4 countries = \$ 11,200.
1 week report preparation/assistance of Z.C. in
each country = N.C.
- 6) Priorities Identification Workshop:
same as item 4 above = \$ 40,550.
- 7) Training Course: Similar to items 4 and 6 above allowing for increased
participation = \$ 50,000.
- 8) Network Strengthening: including country-specific additional land-use
systems analysis site-specific case studies and location/country-specific
problem identification led by the Zonal Coordinator w/input from ICRAF
Program Coordinators and other core staff: estimated in-country
operational costs \$10000/country/yr x 4 countries x
4 years = \$160,000.
- 9) Information Exchange - preparation of reports of major project meetings
periodic research reporting, newsletter preparation.
- 10) Annual Networking Meetings: similar to Workshops but one week in
duration = \$ 20,000 year.
- 11) Research implementation Costs - see separate sheets on: Research
Implementation Costs, Commodities, Commodities Purchase Plan and Host
Country contributions.
- 12) Evaluations- mid-term and final involving two persons each.

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Research Implementation Costs - LOP - 5 years

<u>DESCRIPTION</u>	<u>\$ COST</u>
<u>Research Manager</u> - (full-time) x 5 yrs @ \$100,000./yr	\$ 500,000.
<u>Senior Counterparts</u> (4) - part-time - salary	HCC*
<u>Senior Counterparts</u> (4) - infield per diem: 5 days x 3 trips x 4 people x \$50/day x 5 years:	\$ 15,000.
<u>Technical Counterparts</u> (full-time) (4) @ \$3,000/yr x 5 yrs.	\$ 60,000.
<u>Drivers</u> (full-time) - (4) @ \$800/yr x 5 yrs.	\$ 16,000.
<u>Laborers</u> (full-time) - 3 per country x 4 countries @ \$500/yr x 5 yrs	\$ 30,000.
<u>Guards</u> (full-time) - 2 per country x 4 countries x 5 yrs @ \$700 per/yr.	\$ 28,000.
<u>Seasonal Laborers:</u>	
-nursery startup - 5 persons x 5 days x 4 countries	= 100 p/d
-planting - 20 persons x 5 days x 4 countries	= 400 p/d
- maintenance - 5 persons x 5 days x 4 countries x twice/yr	= 200 p/d
= 700 person days/year	
rounded to 1000 p/d per year @ \$3/day = \$3000/yr x 5 years.	\$ 15,000.
<u>Communications</u> (telephone/telex) \$200/mo. x 12 mos. x 4 countries x 5 yrs	\$ 48,000.
<u>Cooperators Workshops</u> (twice/yr)	
-travel: 6 persons x \$500 x 2 x 5 yrs	\$ 30,000.
-per diem: 6 persons x 5 days x \$75/d x 2 x 5 yrs.	\$ 22,500.
	\$ 764,500.
<u>Collaboration w/other institutions</u> (national/donor) for improved seed production - yrs. 3-4-5 @ \$100,000./yr.	\$ 300,000.
TOTAL	\$1064,500.

*Host Country Contributions

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Commodities (Start up/ implementation)

<u>Item</u>	<u>Cost \$</u>
- <u>Vehicles</u> (four in yr. 1 and four in year 4.) @ #15000	120,000.
- <u>Vehicle spares</u> - 25% in each yr. of purchase	30,000.
- <u>POL</u> : 20000 Km/veh/yr.	80,000.
- <u>Nursery Materials</u>	40,000.
- <u>Tools</u>	20,000.
- <u>Fencing</u>	20,000.
- <u>Seeds/Seed Collection</u>	10,000.
- <u>Seed Storage capability</u> (rental)	15,000.
- <u>Books/Publications</u>	4,000.
- <u>Office Supplies</u>	4,000.

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Commodity Purchase Plan

Year Item	1	2	3	4	5
Vehicles	60,000.			60,000.	
Spares	15,000.			15,000.	
Maint.	6,000.	6,000.	6,000.	6,000.	6,000.
POL	16,000.	16,000.	16,000.	16,000.	16,000.
Nursery Mat.	20,000.	5,000.	5,000.	5,000.	5,000.
Tools	15,000.	1,250.	1,250.	1,250.	1,250.
Fencing	20,000.				
Seeds	2,000.	2,000.	2,000.	2,000.	2,000.
Seed Storage	3,000.	3,000.	3,000.	3,000.	3,000.
Books	800.	800.	800.	800.	800.
Office Supplier	800.	800.	800.	800.	800.
Yearly Totals	158,600.	34,850.	34,850.	109,850.	34,850.

Host Countries' Contributions

- Ministerial/Institution Representatives (part time) on Agorforestry
Cordinating Committees -3-4 per country
- Senior Research Implementation Counterpart - (part-time) - 1 per country
- Technical Counterpart - full-time- designation only (project covers all
costs) - 1 per country
- Land use required for trials
- Access to nursery facilities (project pays labor/materials/minor
improvements) - 1 per country
- Office space/furniture

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IMPLEMENTATION PLAN

	1	2	3	4	5
1) Mobilization (1-3) Promotion/Organization and information collection	<----->				
2) Introduction to project Networking and training in land-use analysis	<->				
3) Land-use problem analysis (in each country (5-6-7))	<----->				
<u>IMPLEMENTATION</u>					
4) Priorities ID Workshop	* *				
5) Research design methodology training (by country)	***				
6) Research Mobilization-species selection criteria-site selection seed collection (a continuum)	<----->	----->	----->	----->	----->
7) Planting field trials		< >	< >	< >	< >
8) Research Analysis		----->	----->	----->	----->
9) Evaluation			< >		< >
<u>CONTINUED NETWORKING</u>					
10) Case Study	<----->				
11) Improved Land-use Analysis	<----->				
12) Location Specific Project ID		<----->			
13) Information Exchange	<----->				
14) Annual Network Mtg.		< >	< >	< >	< >

APPENDIX - MPT Species Continuum

General

1. The steps outlined on the MPT Species Continuum are geared towards the production of improved seed needed for conducting species/agroforestry technology evaluation and to develop MPT selection criteria and provide selected trees that can be used for the establishment of seed orchards.
2. ICRAF should emphasize the aspects of this continuum leading to the development of species/agroforestry technologies, and it is also expected to collaborate with other donors/institutions in the establishment and management of seed orchards geared towards the production of large quantities of improved seed.
3. Tree selection criteria for individual species should initially be based on the desired end-products/uses for that tree, e.g., fuelwood, forage, building materials, windbreaks, etc. These criteria will be refined as results from species/agroforestry technologies research are obtained.
4. A small number (5-10) of MPT species are to be selected, based on current knowledge available and local preferences, for conducting the research envisaged in this project.

Categories of MPT species*

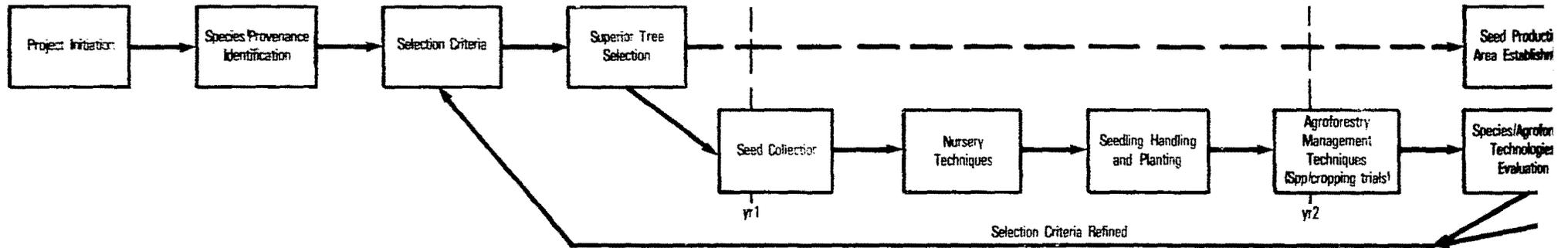
1. MPT species are divided into 4 categories.
 - a. Locally utilized, well-known species (indigenous or exotic);
 - b. Locally utilized, little-known species (indigenous or exotic);
 - c. Unknown native species with excellent potential and
 - d. Unknown exotic species with excellent potential.
2. Research phases shown in Figure 1 for locally utilized, well-known species, are repeated in the other 3 species categories, but additional phases are added to each category continuum according to the amount of information that is available about a particular species. The research phases and approximate time frame needed to complete each category continuum are as follows:
 - a. Locally utilized, well known species (5 yrs).

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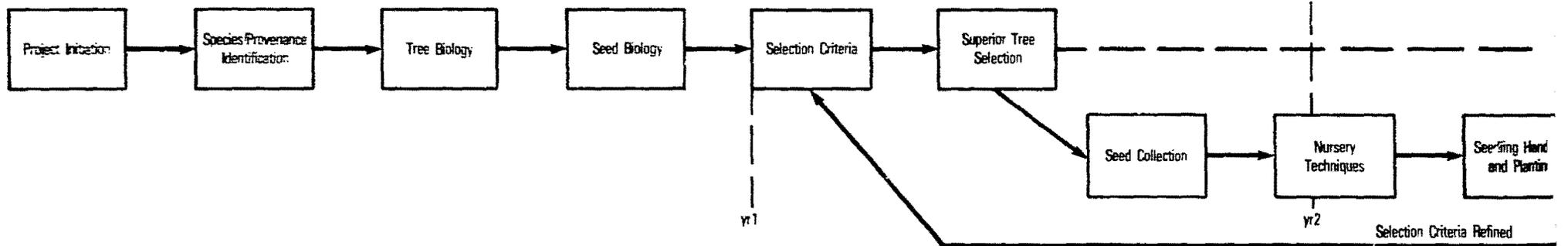
- 1) Species/provenance identification (emphasis on provenances)
 - 2) Tree selection.
 - a) selection criteria refined as additional data become available.
 - b) seed production areas established based on seed needs.
 - c) collaborate with other donors in the establishment and management of seed orchards.
 - 3) Seed collection.
 - 4) Cultural techniques using a limited number of agroforestry technologies and a limited number of species tested under specially developed experimental designs.
 - 5) MPT species/agroforestry technologies evaluation.
- b. Locally utilized little-known species (6 yrs).
- 1) Species/provenance identification.
 - 2) Tree and seed biology.
 - 3) Repeat phases a. 2) through a. 5) above.
- c. Unknown native species with excellent potential (10 yrs).
- 1) Species/provenance identification (*emphasis on species*).
 - 2) Species/provenance trials.
 - 3) Tree and seed biology.
 - 4) Repeat phases a. 2) through a. 5) above.
- d. Unknown exotic species with excellent potential (13 yrs).
- 1) Species/provenance identification (*emphasis on species*).
 - 2) Species/provenance screening trials.
 - 3) Large-scale (1-2 ha) species/provenance trials using winners from d. 2).
 - 4) Tree and seed biology.
 - 5) Repeat phases a. 2) through e. 5) above.

Figure 1. Tree Species Continuum*

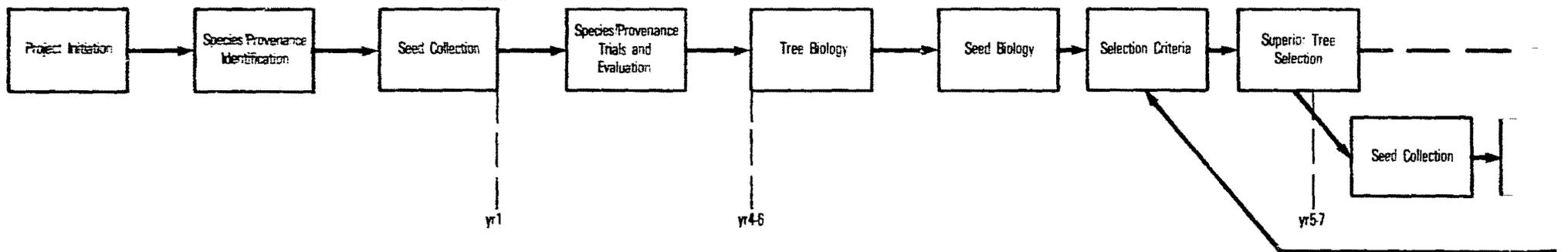
1. Locally Utilized, Well-Known Species, e.g., Grevillia (exotic); Maesopsis (indigenous)



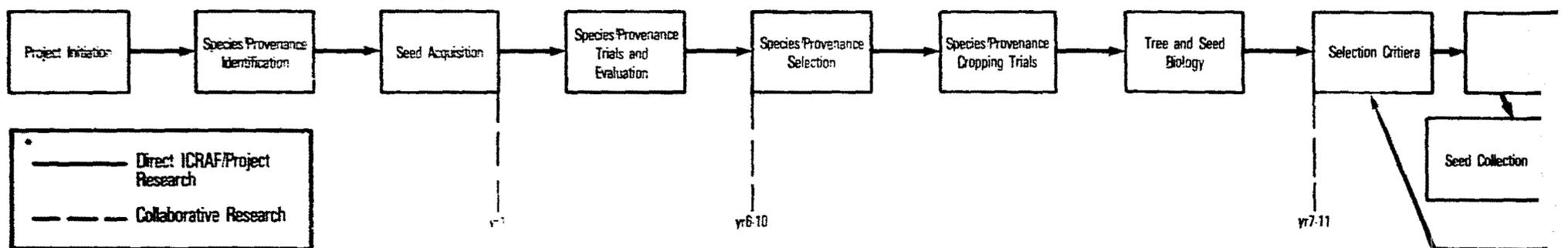
2. Locally Utilized Little-Known Species, e.g., Erythrina (indigenous); Calliandra (exotic)



3. Undomesticated Native Species with Excellent Potential, e.g., Albizia (exotic); Markhamia



4. Untested Exotic Species with Excellent Potential, e.g., Leucaena



— Direct ICRAF/Project Research
 - - - Collaborative Research

