

Improving Soil Quality and Crop Productivity through Farmers Tested and Recommended Conservation Agricultural Practices in Cropping Systems of West Africa



Sustainable Agricultural and Natural Resource Management – Collaborative Research Support Program (SANREM – CRSP)

Lead Institution: Kansas State University

**P.V. Vara Prasad
Department of Agronomy
E-mail: vara@ksu.edu**

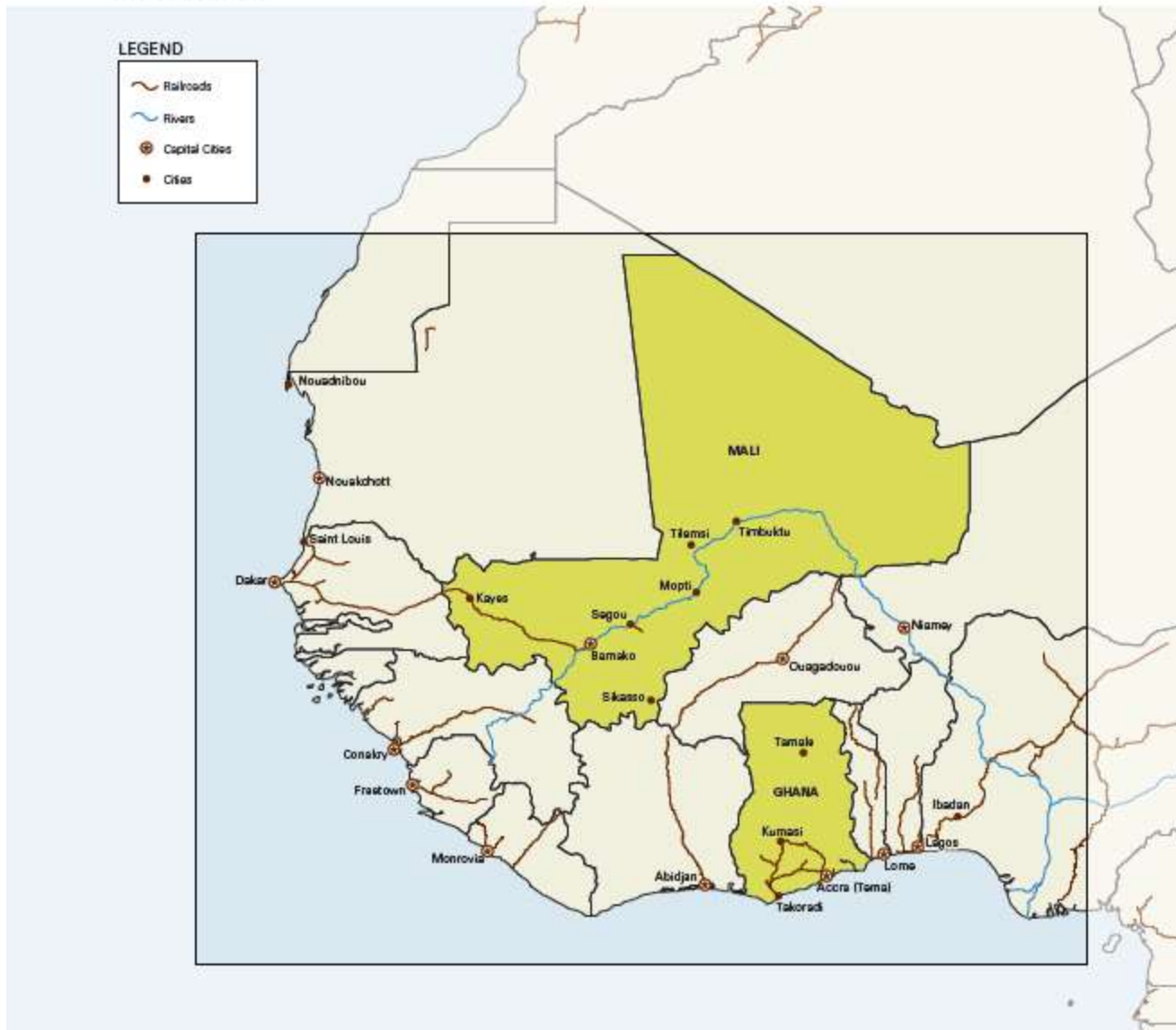


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W. Africa: Mali and Ghana

Map of West Africa



K-State Team



P.V.V. Prasad



T. Dalton



N. Lilja



C. Rice



S. Staggenborg



T. Selfa



D. Presley



K. Dhuyvetter



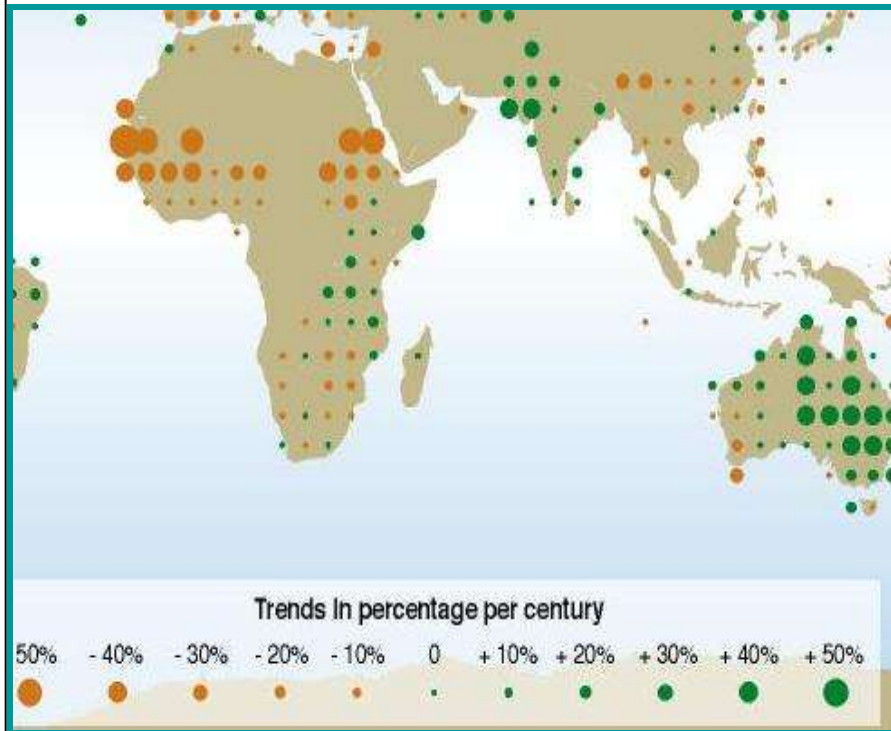
K. Garrett



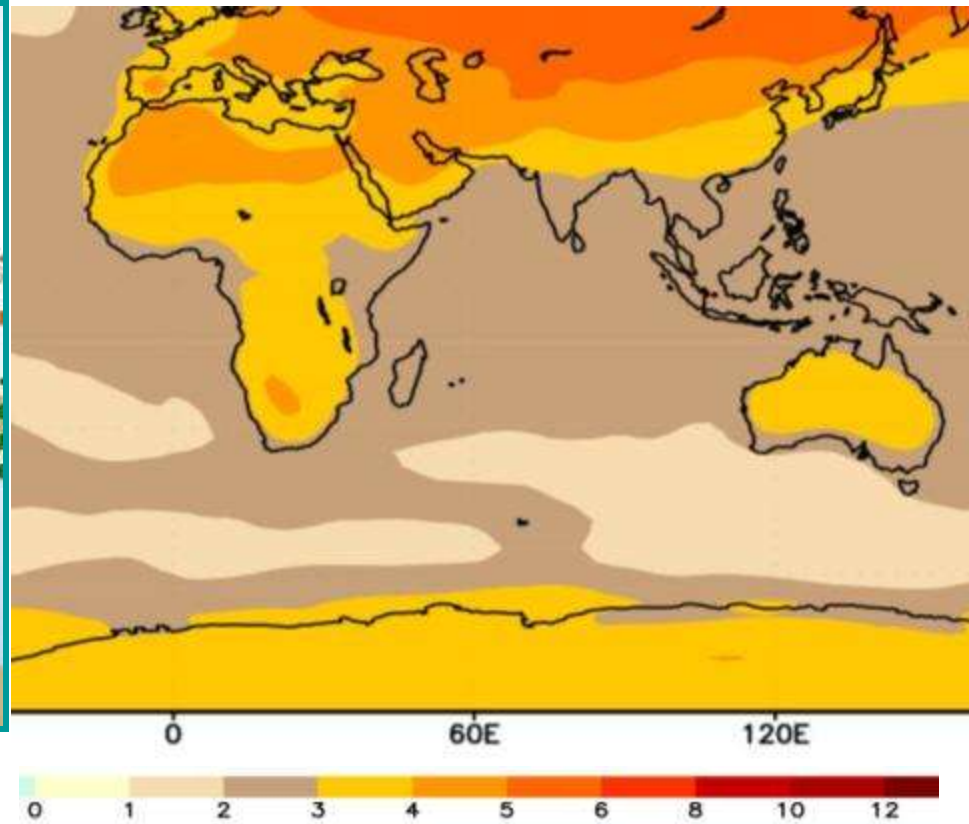
A. Jumpponen

Multi-disciplinary: integrated for research, extension and graduate training

W. Africa: Problems: Climate Change



Projected Water Resources



Projected Temperatures

West Africa is going to experience more heat and drought stress.

Problems: Soil Erosion and Soil Quality



Soil Erosion: Wind



Soil Erosion: Water

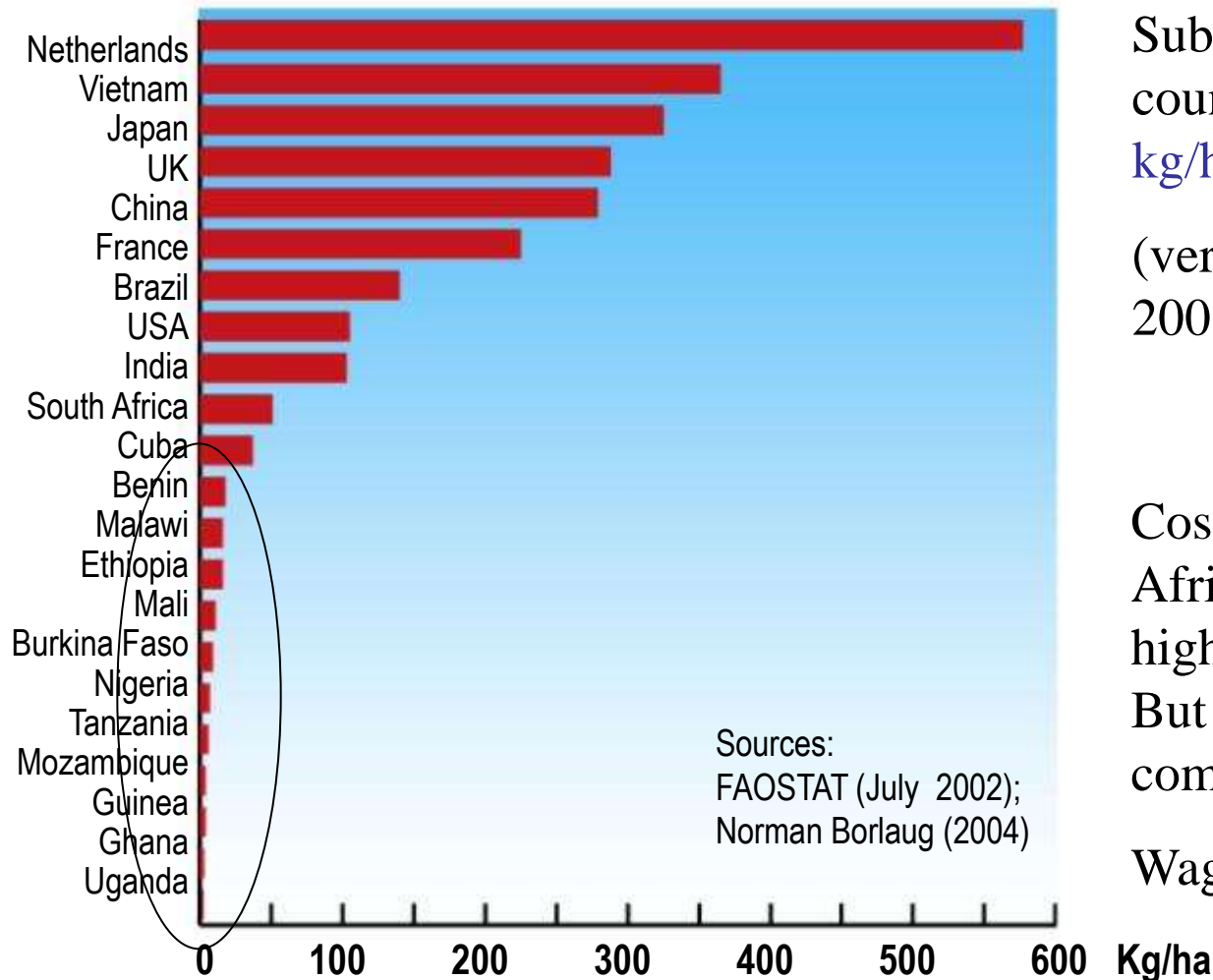


Wild Fires: Burning



Poor Soil Fertility

Problems: Soil Fertility and Fertilizer Use



Sub-Saharan African countries use **less than 10 kg/ha** of fertilizer

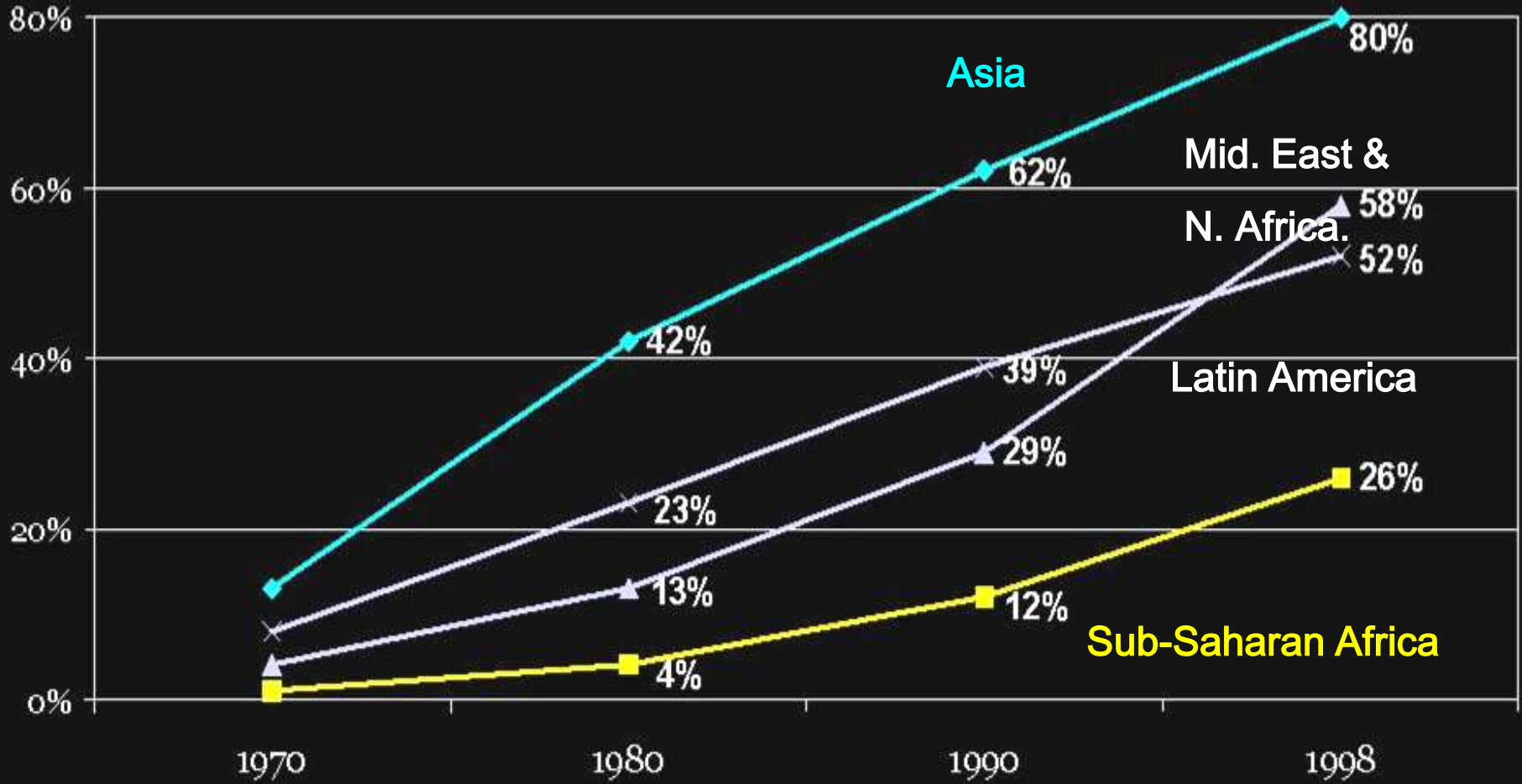
(versus an average of 100-200 kg/ha in Asia)

Cost of fertilizer for West African farmer is similar or higher than US farmers cost. But his income is 0.10% compared to US farmers.

Wages per day is about <\$5.

Problems: Cultivar Adoption and Genetics

New Variety Adoption by Region



Source: Calculated from data in R.E. Evenson and D. Gollin, 2003. *Crop Variety Improvement and its Effect on Productivity*. Cambridge, MA: CABI.

Our Project: Goal

Our overall goal is to provide food security by increasing economic returns to smallholder farming households dependent on rain-fed agriculture.

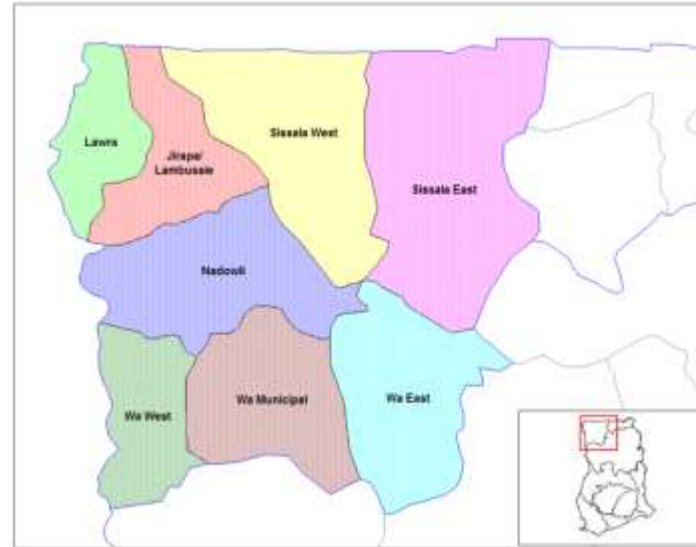
This will be achieved through gender-sensitive farmer participatory development, discovery and dissemination of sustainable CAPS that improve soil quality, water capture, water use efficiency, crop productivity, and efficient use of inputs and labor.



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Region – Ghana – Upper West - Villages



Districts: Municipal, Wa West, Nadowli and Lawra.

Lawra District: Brutu, Bo and Puffiu. (NGO, LACERD).

Nadowli District: Sombo (NGO, Upper West Agro-Industries

Wa Municipal: Busa, and Busa Tangzu. (NGO Upper West Agro-Industries)

Wa West District: Nyoli, Sieyiri, Dornye, and Kpongri. (NGO responsible is Lassia Tuolu Agric. Project).

Working in 10 villages Upper West Region

Region – Ghana – Upper West



Lead Country PI:

Dr. Jesse B. Naab

Soil Scientist and Cropping Systems

Savanna Agricultural Research Institute

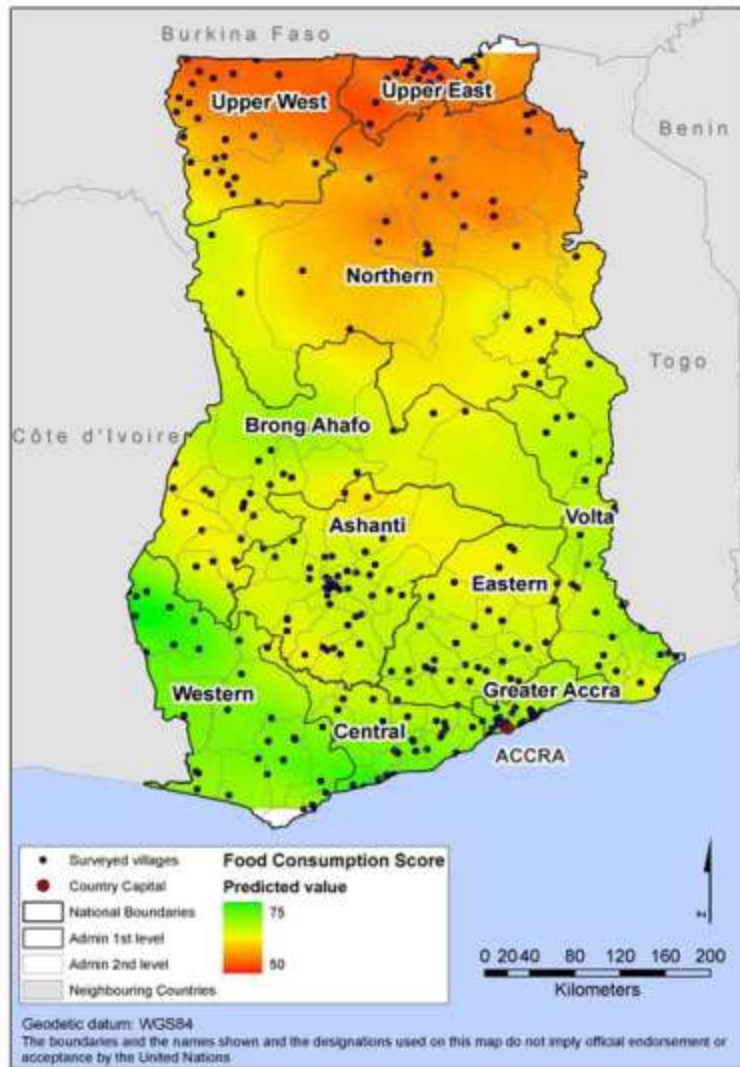
Upper West Region, Wa

Ghana



Providing Leadership in the Region – Passionate about Development

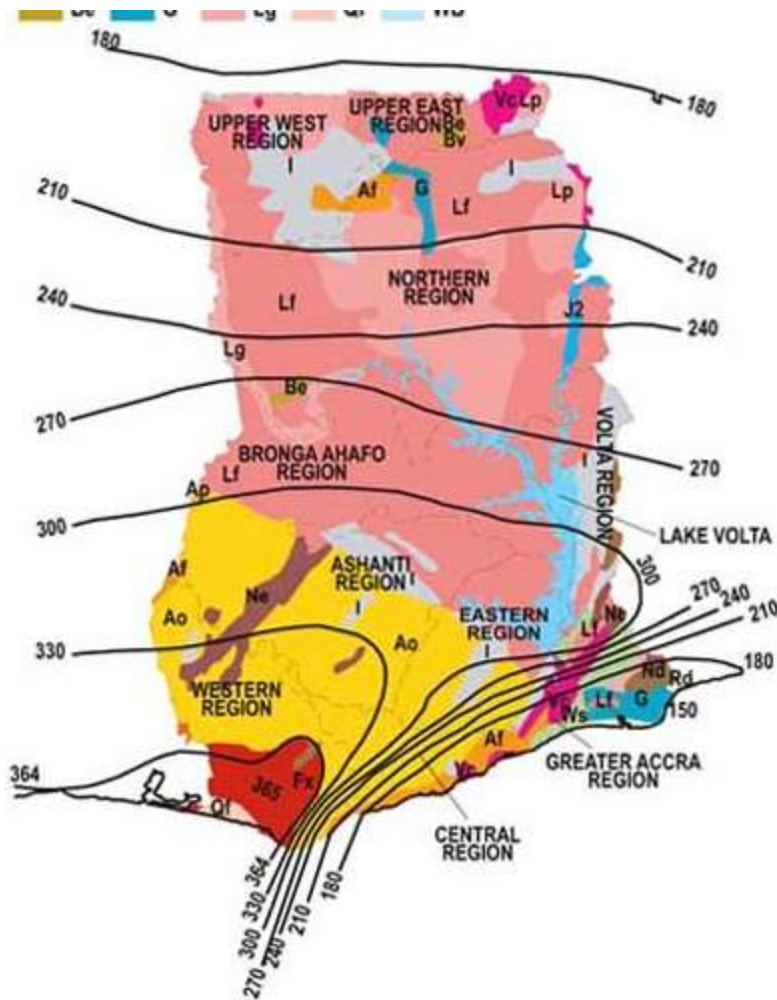
Region – Ghana – Upper West - Villages



Regions	Food Insecure		Vulnerable to food insecurity	
	No. of people	% pop	No. of people	% pop
Western Rural	12.000	1%	93.000	6%
Central Rural	39.000	3%	56.000	5%
Greater Accra Rural	7.000	1%	14.000	3%
Volta Rural	44.000	3%	88.000	7%
Eastern Rural	58.000	4%	116.000	8%
Ashanti Rural	162.000	7%	218.000	10%
Brong Ahafo Rural	47.000	3%	152.000	11%
Northern Rural	152.000	10%	275.000	17%
Upper East Rural	126.000	15%	163.000	20%
Upper West Rural	175.000	34%	69.000	13%
Urban (Accra)	69.000	2%	158.000	4%
Urban (Other)	297.000	4%	572.000	8%
Total	1.200.000	5%	2.007.000	9%

Upper West region is food insecure and vulnerable.

Region - Ghana – Upper West - Soil



Average soil fertility status of upper west region
 Source: Soil Research Institute (SRI) CSIR - Kumasi.

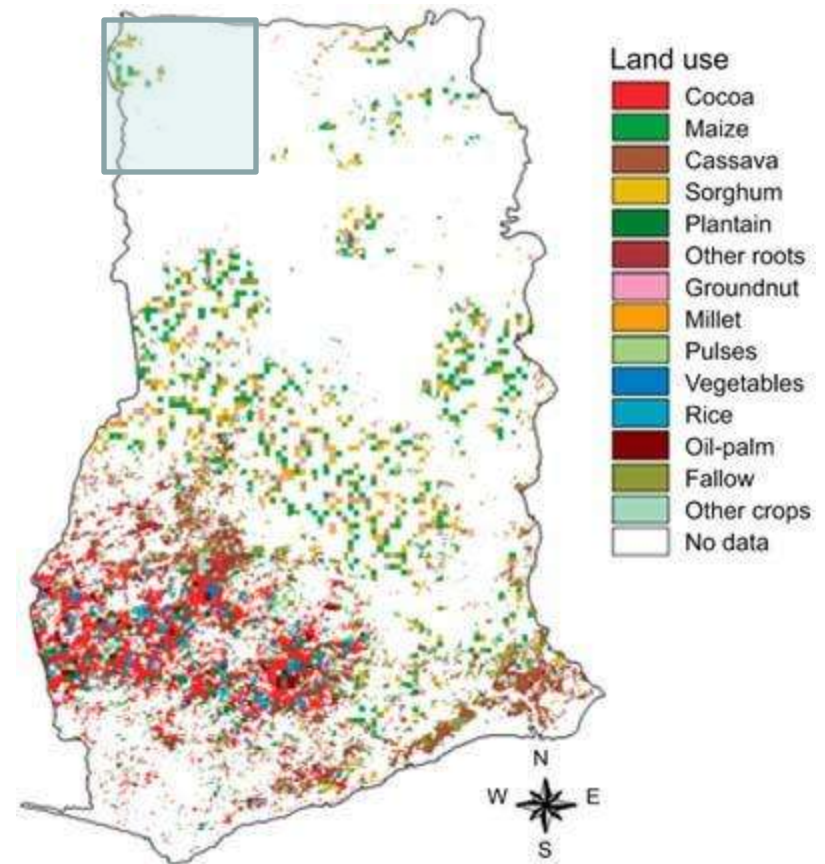
Trait	Upper West
Soil pH	6.0 – 6.8
Organic matter (%)	0.5 – 1.3
Total nitrogen (%)	0.01 – 0.07
Available P (mg /kg soil)	2.0 – 7.4
Available Ca (mg / kg soil)	52 - 152

**Available crop growing season is about 180 – 210 days.
 Soil are mostly light textured with poor fertility.**

Region – Ghana – Upper West - Crops

Main Crops in Upper West Region

Group	Crops
Cereals	Maize, <u>millet</u> , <u>sorghum</u> , rice
Industrial crops	Cotton, sheanut
Legumes	<u>Cowpea</u> , <u>bambara nut</u> , <u>groundnut</u> , <u>soybean</u>
Fruits	Papaya, mango, cashew,
Vegetables	Tomato, pepper, okra,
Roots and tubers	Yam, cassava, sweet potato



Main crops include sorghum, millet, maize, peanut, cowpea and bambara nuts

Region – Ghana – Upper West - Partners



NGOs:

1. Lassia Tuolu Agricultural Project
2. Langmaal Centre for Rural Development Initiatives
3. Upper West Agro-Industries Limited

Region – Ghana – Upper West - Partners

1. **Lassia Tuolo Agricultural Project (LAP)**

The Lassia Tuolu Agricultural Project is an NGO under the Catholic Diocese of Wa. The operational areas of LAP are Wa West and Wa East Districts . The core functions of LAP are:

- **Formation of farmer groups and nurturing them into viable farmer based organizations;**
- **Training of farmers in group dynamics, livelihoods, credit and savings;**
- **Extension services mainly agronomic training; and**
- **Linking of the FBOs to other players in the value chain (input dealers, markets and processors).**

The LAP currently works with 30 Farmers Based Organizations with a total of 600 members

Region – Ghana – Upper West - Partners

2. Langmaal Centre for Rural Development Initiatives

The Langmaal Centre for Rural Development Initiatives (LACERD) is an NGO operating in the Nandom traditional area of the Lawra district (see map) in the Upper West Region. The core businesses of LACERD are:

- **Formation of farmer groups and training;**
- **Agriculture is the main focus;**
- **Concerns about environmental issues; and**
- **Gender issues and training**

3. Upper West Agro-Industries Limited (UWAgI)

The Upper West AgroIndustries Limited is a local NGO established 10 years ago with the goal of contributing to food security and poverty reduction. The UWAgI works with about 120 farmer groups by providing inputs (land preparation, seeds and fertilizers) to produce soybean which is then purchased by the company. The farmer groups own shares in the company.

Region – Mali



Lead Country PI:

Dr. Mamdou Doumbia

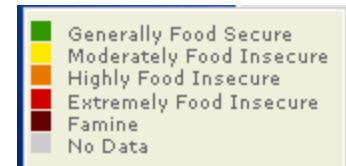
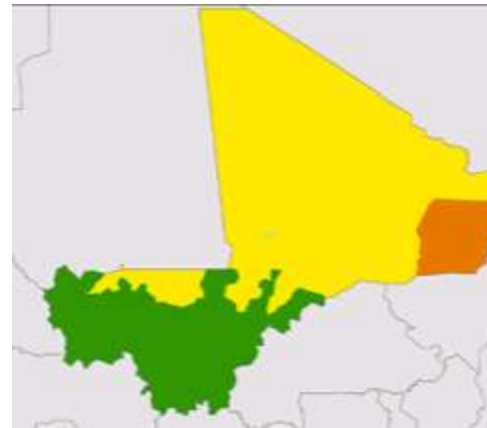
Soil Scientist

Institute of Economic and Rural Development

Mali

Passionate Researchers

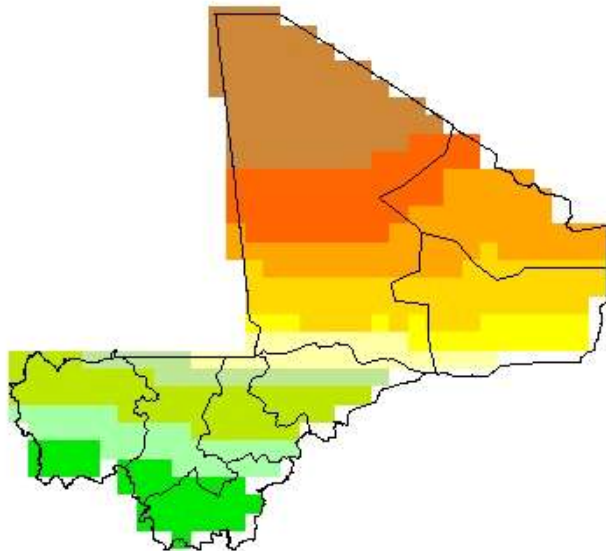
Region – Mali – Mid and North Districts



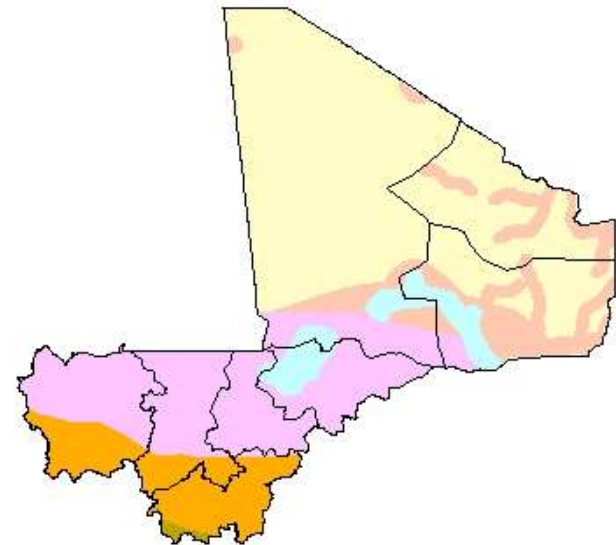
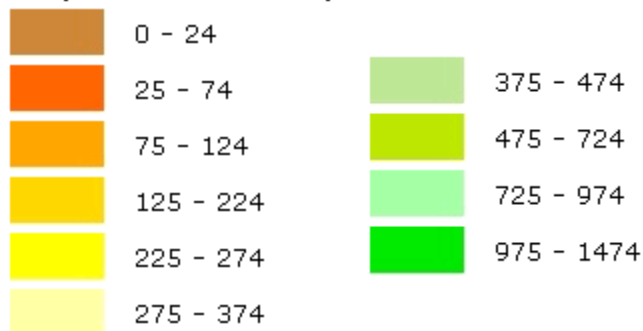
Villages	Region	Rain (mm)	Cropping System
Koporopin	Mopti	500	Millet
Lagassagou	Mopti	500	Millet
Fambougou	Segou	700	Millet / Sorghum
Bouawere	Segou	700	Millet / Sorghum
Sigidolo	Segou	800	Sorghum
Oumarbougou	Sikasso	800	Maize
Fansirakoro	Koulikoro	900	Maize
Noyaradougou	Sikasso	1000	Maize

Most northern regions are food insecure and vulnerable.

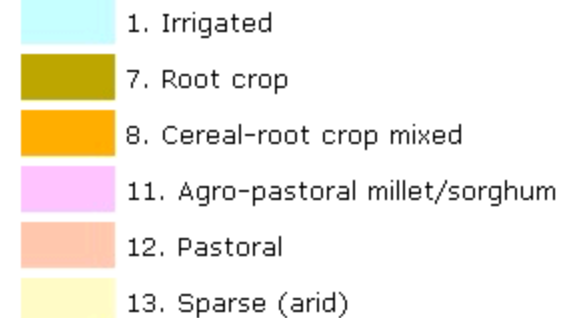
Region – Mali – Rainfall and Crops



Precipitation Ave mm/year



Farming Systems



Most central and northern regions are dry and south is wet. Important crops include sorghum, millet and cotton in north.

Region – Mali – Partners



Extension Service:

National Department of Agriculture
Regional Department of Agriculture



NGO :

1. PRECAD: Syngenta foundation (agricultural development)
2. AMADE: Malian Association for Development (socio-economic development of rural population)
3. AMEDD: Association of Malian Development (sustainable rural development)

Conservation Agricultural Practices (CAPS)

Can CAPS help small farmers improve productivity and help adapt to climate change?



Crop Residue



Cover Crop



Minimum Tillage



Crop Rotation



Water Harvesting



Nutrient Management

Our Project: Critical Questions

Critical questions associated with CAPs for smallholder resource-poor farmers of West Africa, include:

- (a) which CAPs can positively contribute to productivity, address needs of farmers and under what specific conditions;**
- (b) what are positive and negative aspects (trade-offs) of CAPs both in short-term and long-term;**
- (c) can CAPs be economically beneficial in short run, can they be adopted by smallholder farmers and if preconditions for adoptions exist; and**
- (d) which types of processes are most efficient in assessing CAPs with farmers and extending them to larger scale.**

Conservation Agricultural Practices (CAPS)



Crop residue is available.

Conservation Agricultural Practices: Challenges

Residue Picked up



Stored and Alternative Uses



Residue High Market



Building Material



Crop residue is valuable forage, and important building material.

Conservation Agricultural Practices: Challenges

Fences



Free Grazing



Termites



Fire

If left in field problem of free grazing, termites and fire.

Research Approach

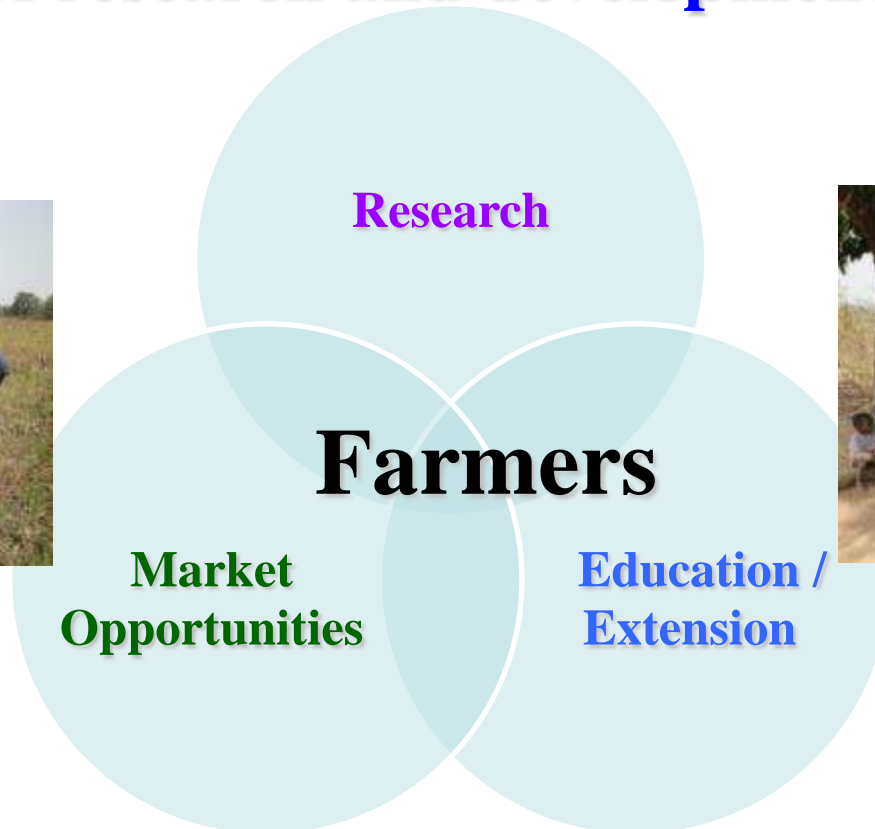
Discovery, capacity building and dissemination are the key for improving agriculture in Africa



Capacity Building and Extension

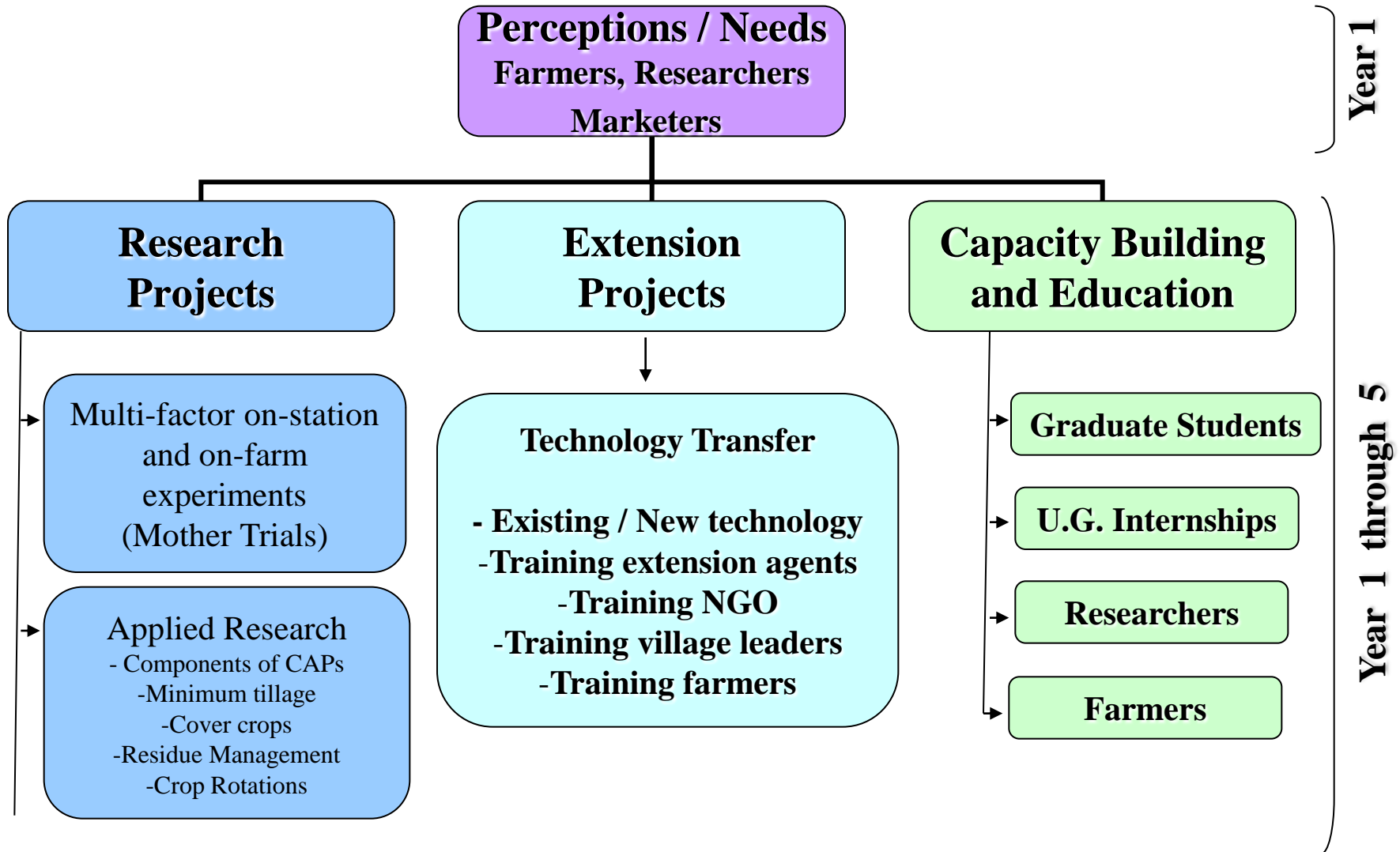
Farmers Driven Research Approach

Farmers should be the key component at all stages of research and development



**Farmers should feel ownership in research.
Build-on existing local technologies.**

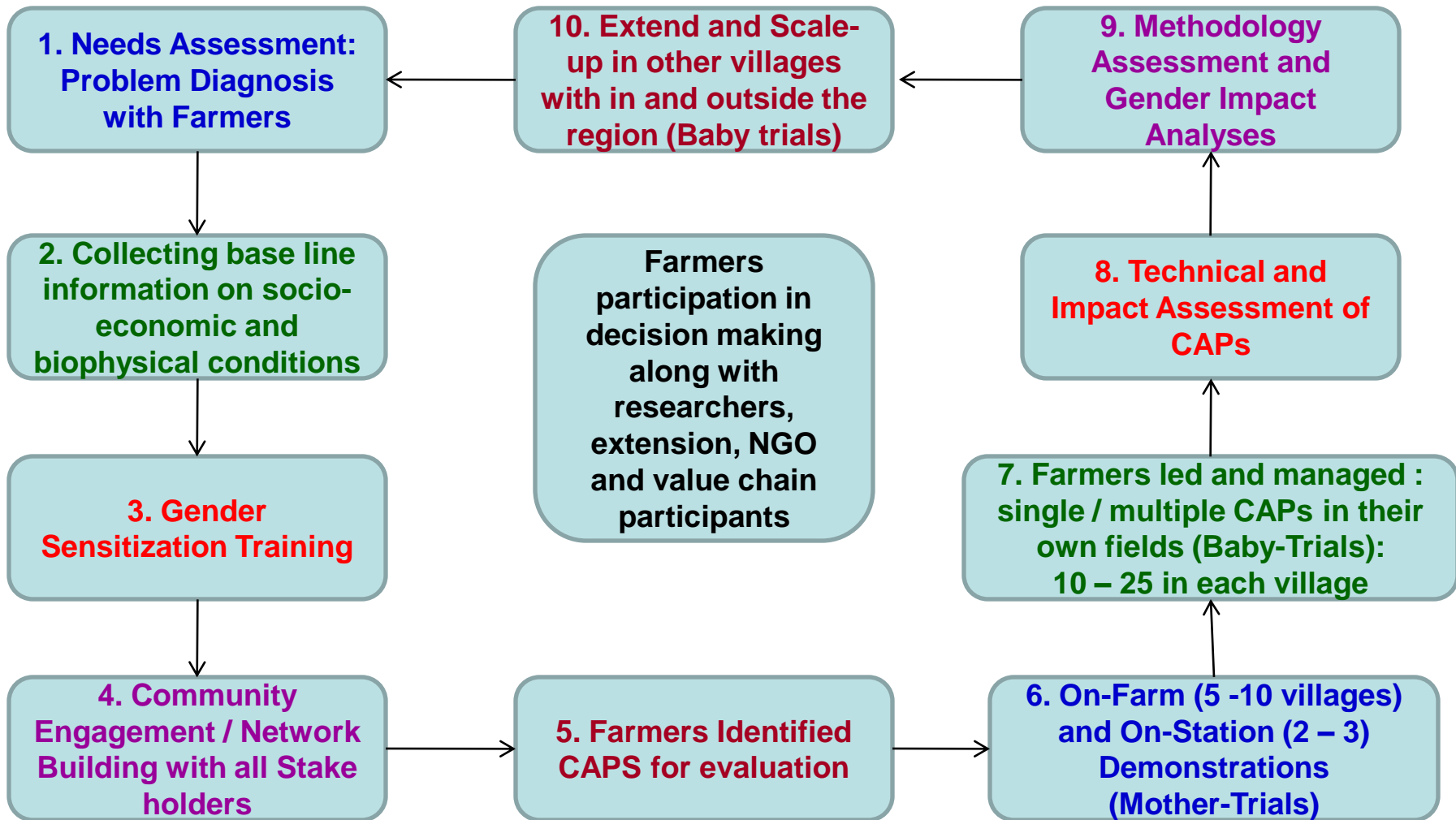
Farmers Driven Research Approach



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Approach and Road Map



Year – 1: Tentative Plan / Time Frame

Year/Month	Plan of Activities
✓ Dec – Jan 09	<ul style="list-style-type: none">- Planning meeting collaborators- Identification of sites, and villages for surveys- Interviewing potential students
✓ Jan - Feb 10	<ul style="list-style-type: none">-Development of questionnaires, and minimum data-set for social and biophysical data- Identification of graduate students
✓ Mar – Apr 10	<ul style="list-style-type: none">-Pretesting of questionnaires, and conducting village baseline surveys
May – June 10	<ul style="list-style-type: none">-Analysis of village survey- Determination of treatments (for multi-factor long-term trial and technology transfer experiments)
June 10	<ul style="list-style-type: none">-Defining and planting research studies, and planning extension and capacity building activities.
Jul – Sep 10	<ul style="list-style-type: none">- Evaluating progress and data collection from different experiments

Training of Enumerators / Staff: Ghana



Developing Base Line Surveys with Partners



Thank You - Questions



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