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Ethiopian Institute of Agricultural Research

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# **Soil and Water Research Directorate**

## **Research Directory**

**2009-2010**

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# **Case Team: Management of Problematic Soils**

**Case Team Coordinator:** Getachew Alemu

**Project Title:** Management of acid soils for improving agricultural production and productivity in Ethiopia

**Project Coordinator:** Tesfu Kebede

## **General objectives**

- To develop integrated acid soil management options for sustainable crop production;
- To reclaim acid soils so as to improve production and productivity of crops and improve fertilizer use efficiency;
- To contribute to the improvement of the livelihoods of the peoples relying on agricultural production in Ethiopia ; and
- To develop IPM, IDM and IWM on acid soils

## **Expected outputs**

- Resource use pattern in representative acid soil based farming systems characterized and documented;
- Constraints related to the production, marketing and utilization of crops and livestock identified and prioritized;
- Possible research, extension, development and policy interventions suggested;
- Optimum lime rates and economically feasible rates of P fertilizer application for different crops identified;
- Information on the contribution of split application of lime developed;
- Information will be generated to develop models whereby the change in acidity indicators of soils can be predicted as a result of lime application;
- Indicative information on the relative contribution of organic sources on acid soil amelioration obtained;
- Information on the prevalence of weeds, disease and insect pests due to FYM, compost and lime application obtained;
- Awareness will be created among the farming communities on the benefits of lime application;
- Increased production and productivity of crops through the amelioration of acid soils;
- Acid tolerant food and feed crop varieties developed; and
- Established database on acid soils

## Component I. Reclamation and management of acid soils

### Baseline studies of acid soil based farming systems in Ethiopia

#### Objectives

- To describe and understand agricultural production practices and farmers' management strategies of acid soil based farming systems;
- To analyze and prioritize the major production problems of acid soil based farming systems; and
- To assess and identify feasible improvements for the identified constraints.

Implementing Centers	Locations	Responsible Researchers
Holetta	Bedi, Endibir, Nejo	Chilot Yirga, Getachew Alemu, Temesgen Desalegn
Pawe	Awi	Assefa Menna, Mesfin Tadesse
Asosa	Assoa	Bogale Walelign
Jimma	Jimma, Metu, Haru	Teshome Kumela, Tesfu Kebede, Anteneh Netsere, Jafar Dawd

**Duration:** 2010

#### Expected Outputs

- Resource use pattern in representative acid soil based farming systems characterized and documented;
- Constraints related to the production, marketing and utilization of crops and livestock identified and prioritized;
- The causes, effects and farmers' control strategies of the constraints investigated;
- Database generated on important aspects of acid soil based farming systems; and
- Possible research, extension, development and policy interventions suggested.

### Influence of lime and P fertilizer on the acid properties of soils under major crops grown in Ethiopia

#### Objectives

- To identify optimum lime and P fertilizer application for different acid soils of Ethiopia;
- To determine the influence of lime on the availability of soil nutrients and acid properties of soils in Ethiopia;
- To determine the effects of liming and Phosphate fertilizer application on yield and yield components of major crops grown in Ethiopia; and

- To develop models whereby the change in acidity indicators of soils can be predicted as a result of lime application

Implementing Centers	Locations	Test crops	Responsible researchers
Holetta	Bedi	Barley/Faba bean	Getachew Alemu, Temesgen Desalegn
	Endibir	Barley/Faba bean	
	Nedjo	Maize/ Soybean	
Jima	Serbo, Seka, Tiroafeta, Hurumu, Metu	Maize/ Soybean	Tesfu Kedede, Anteneh Netsere, Jafar Dawd
	Metu	Maize/ Soybean	Tesfu Kebede
Asosa	Asosa, Amba-8	Maize/ Soybean	Bogale Waleign
Pawe	Awı, Banja	Barley/Faba bean	Assefa Menna, Mesfin Tadesse

**Duration:** 2009 – 2013

### Expected Outputs

- Optimum lime and P fertilizer application rates for acid soils identified;
- Frequency of lime application identified;
- Awareness among the farming communities on the benefits of lime application created; and
- Information will be generated to develop models whereby the change in acidity indicators of soils can be predicted as a result of lime application

### Evaluation of different agricultural lime materials produced in Ethiopia for their agronomic effectiveness on acid soils

#### Objective

To study the agronomic effectiveness of carbonate resources of different Lime Materials produced in Ethiopia

**Locations:** Holetta (Bedi and Nejo)

**Duration:** 2010-2012

**Responsible Researchers:** Getachew Alemu, Temesgen Desalegn

#### Expected Outputs

Agronomic efficiency of the different carbonate resources of different lime materials determined

## Ameliorating effects of organic nutrient sources on nutrient availability and productivity of major crops grown on acid soils of Ethiopia

### Objective

To find out the effects of farmyard manure (FYM), compost and their interactions with lime and inorganic fertilizers on crop productivity and properties of acid soils

Implementing Center	Location	Test crops	Responsible researchers
Holetta	Bedi	Barley/Faba bean	Getachew Alemu, Temesgen Alemu
	Nedjo	Maize/ Soybean	
	Endibir	Barley/Faba bean	
Jima	Melko	Maize/ Soybean	Tesfu Kebede, Anteneh Netsere, Jafar dawd
Asosa	Asosa	Maize/ Soybean	Bogale Waleign
Pawe	Awı, Banja	Barley/Faba bean	Assefa Menna, Mesfin Tadesse

**Duration:** 2009 – 2011

### Expected Outputs

- Indicative information on the relative contribution of FYM and compost on acid soil amelioration obtained;
- Information on the prevalence of weeds, disease and insect pests due to FYM, compost application obtained; and
- Alternative options for acid soil amelioration developed

## Evaluation of NP fertilizer rates for major crops grown on limed soils at selected benchmark sites of Ethiopia

### Objective

To determine optimum NP fertilizer rates for major crops grown on limed soils

**Locations:** Badi, Endibir, Nejo

**Responsible researchers:** Getachew Alemu, Temesgan Desalegn

**Duration:** 2010 – 2012

### Expected Output

Optimum NP fertilizer rates for major crops grown on limed soils determined

## Split application of lime for acid soil amelioration and better crop performance

### Objectives

- To assess the ameliorating ability of lime when applied in split application;
- To determine the effects of lime split applied on crop performance;
- To determine the economic benefit of lime applied in split; and
- To determine the efficiency of split application of lime on crop productivity and properties of acid soils

Implementing Centers	Locations	Test crops	Responsible researchers
Holetta	Bedi	Barley/Faba bean	Getachew Alemu, Temesgn Desalegn
	Endibir	Barley/Faba bean	
	Nedjo	Maize/ Soybean	
Jima	Serbo, Seka, Tiroafeta, Hurum, Mettu	Maize/ Soybean	Tesfu Kebede, Anteneh Netsere, Jafar Dawd
	Metu	Maize/ Soybean	Tesfu Kebede
Asosa	Asosa	Maize/ Soybean	Bogale Walelign
Pawe	Awı, Banja	Barley/Faba bean	Assefa Menna, Mesfin Tadesse

**Duration:** 2009 – 2012

### Expected Outputs

- Indicative information on the relative contribution (Economic, yield, and soil amendment) of split application of lime for acid soil amelioration obtained;
- Alternative options of frequency of lime application for acid soil amelioration developed; and
- Awareness will be created among the farming communities on the benefits of lime application methods

## Component II. Development of acid tolerant food, feed and industrial crops

### Evaluation of introduced, improved, and pipeline varieties of major food crops for acid soils tolerance in Ethiopia

#### Objective

To identify acid tolerant high yielding and promising varieties of major crops

**Locations:** Bedi, Endibir - Barley, faba bean, wheat, linseed  
Nejo - maize, noug, soybean, finger millet

**Responsible researchers:** Getachew Alemu, Temesgen Desalegn, crop breeding teams

**Duration:** 2009 – 2011

### **Expected Outputs**

- Acid tolerant crop varieties will be developed;
- Alternative options will be developed for acid soils amelioration;
- Strengthened the capacity of agronomists, DAs, Farmers and researchers
- Established database on acid soils; and
- Awareness will be created among the farming communities on the benefits of acid tolerant crops/varieties

### **Evaluation of introduced lines of selected pasture grass species for tolerance to acid soils in Ethiopia**

#### **Objective**

To identify acid tolerant high quality herbage yielding species and lines of pasture grasses.

**Locations:** Bedi, Endibir, Nejo

**Responsible researchers:** Muluneh Minta

**Duration:** 2009-2012

### **Expected Outputs**

- Acid tolerant pasture grass species identified;
- Awareness will be created among the farming communities on the benefits of producing high quality pasture grass; and
- Wastelands /underutilized lands will be reclaimed for animal feed production

### **Evaluation of introduced lines of forage pea nut (*Arachis pintoii*) for tolerance to acid soils in Ethiopia**

#### **Objectives**

To identify acid tolerant high quality herbage yielding lines of forage pea nut (*Arachis pintoii*).

**Locations:** Bedi, Endibir, Nejo

**Responsible researchers:** Muluneh Minta

**Duration:** 2009-2012

### **Expected Outputs**

- Acid tolerant forage crop varieties will be developed;
- Awareness will be created among the farming communities on the benefits of producing high quality forage legumes in an area otherwise left aside as marginal land; and
- Wastelands /underutilized lands will be reclaimed for animal feed production

### **Component III: Verification, demonstration and scaling-up of technologies**

**Verification and demonstration of promising lime application rates for different crops on-farmers' field**

#### **Objective**

To disseminate and popularize acid soil management technologies

**Locations:** Bedi, Endibir, Serbo, Mettu

**Responsible researchers:** Getachew Alemu, Temesgen Daselegn, Tesfu Kebede, Anteneh Netsere, Jafar Dawd

**Duration:** 2010

**Project Title: Improving productivity of salt affected soils through amelioration and management practices**

**Project Coordinator:** Fentaw Abegaz

#### **General Objectives**

- To increase the productivity of salt affected soils through chemical and biological management practices and efficient utilization of water resources particularly those in the moisture deficit arid, semi-arid and sub- humid irrigated areas of the country; and
- Build the research capacity of the project

#### **Expected Outputs**

- Effective sodic soil amendment practices developed;

- Appropriate fertilizer rate for saline and sodic soils identified;
- Appropriate water management practices for saline and sodic soils developed;
- Crop, forage and multipurpose tree species /varieties adaptable to saline and sodic soils identified;
- Sodic soil ameliorating tree species will be selected; and
- Salt affected soils management technologies promoted

## **Component I: Management and reclamation of salt affected soils**

### **Chemical amendments and use of physiologically acidic N fertilizers in sodic and calcareous sodic soils**

#### **Objectives**

- To evaluate relative effectiveness of gypsum and sulphuric acid in ameliorating soil sodicity;
- To study the effect of chemical amendments on N use efficiency; and
- To determine optimum rate of N and best combination of amendments under alkaline/sodic soil condition

**Locations:** Melka Sadi, Lower Awash, Arbaminch, Zeway

**Responsible researcher:** Getnet Adugna

**Duration:** 2009-2010

#### **Expected Outputs**

- Effectiveness of sodic soil amending chemicals and relative economic advantage will be known; and
- Optimum N rate for sodic soil will be identified

## **Component II: Development of salt tolerant food, feed and industrial crops**

### **Evaluation of different salt tolerant grasses, legumes and multipurpose tree species for their ameliorative effect under salt affected soil conditions**

#### **Objectives**

- To identify grasses and legume crops that can successfully ameliorate salt affected irrigated soils to bring back agriculturally productive level; and
- To evaluate multipurpose tree species for management and reclamation of salt affected soils

**Location:** Melka Sedi, Werer

**Responsible researchers:** Fentaw Abegaz, Getnet Adugna, forage researchers

**Duration:** 2009-2011

### **Expected Out puts**

- The growth performance and yield of different forage grasses and Legumes known under salt affected irrigated soils;
- The impact of growing forage grasses and legumes on the soil physico chemical property of the salt affected irrigated soils;
- Forage grasses and legumes that play role in amelioration of the salt affected irrigated soils known and understood by farmers;
- Quantified information made available;
- Guidelines and technical manuals produced and made available to end users; and
- Technologies for the reclamation and management of salt affected soils using the potentials of multipurpose trees will be obtained

### **Evaluation of different crops and crop varieties for salt tolerance**

#### **Objectives**

- To test and identify available accessions of rice, wheat, cotton for salt tolerance; and
- To test and identify well adapted and better tolerant crops and improved cotton varieties for reclaiming salt affected soils.

**Location:** Werer, Melka Sedi

**Responsible researcher:** Fentaw Abegaz, Getnet Adugna, crop breeding team

**Duration:** 2008 - 2011

### **Expected Outputs**

Cotton, rice and wheat crops and crop accessions that are relatively salt tolerant and that can be best fit in the production system will be identified and available for users.

### **Evaluation of different tree species for salt tolerance**

#### **Objective**

To select and recommend tolerant and well performing tree species for salt affected soils.

**Location:** Melka Sedi, Werer

**Responsible researchers:** Fentaw Abegaz, Getnet Adugna, forestry researchers

**Duration:** 2009-2011

### **Expected Out puts**

The best performed tree species will be selected and recommended for salt affected soils.

## **Component III: Technology verification and promotion**

### **On farm verification of simultaneous leaching and paddy rice cultivation**

#### **Objective**

To adopt and test the beneficial effect on soil properties and economic advantage of paddy rice cultivation during leaching practices

**Location:** Melka Sedi salt affected farm area

**Responsible researchers:** Fentaw Abegaz, Getnet Adugna

**Duration:** 2009-2010

#### **Expected Outputs**

The practical applicability, economic advantage and effect on soil property of simultaneous cultivation of paddy rice with leaching practice studied and quantified information made available for agro pastorals and private and commercial farmers.

**Project Title: Management of Vertisols for sustainable production and productivity of food and feed crops in Ethiopia**

**Project Coordinator:** Hailu Regassa

#### **General Objectives**

Contribute to enhanced food security and improved livelihoods through generation of improved technologies and sustainable management of natural resource in Vertisols areas of Ethiopia.

#### **Specific Objectives**

- To develop or adapt improved Vertisols management techniques (animal based as well as mechanized) and refine the existing implements in order to improve the over all utilization of these soils in Ethiopia;

- To study different fertilizer sources, rates, application methods drainage systems and their interactions for Vertisols areas;
- To develop effective irrigation management practices (methods, frequency, amount etc..) from water harvesting structures and other water sources in the highlands and low land Vertisols areas;
- To develop improved cropping systems (crop rotation, double cropping, relay cropping, intercropping, etc) using different crop options and giving emphasis to sustainable utilization of natural resource base of Vertisols areas;
- To investigate efficient agro-forestry and silvo-pastoral sets suitable for Vertisols areas;
- To implement necessary agro climatic data recording and handling systems to support improved land, water and crop management;
- To develop waterlogging tolerant crop and forage varieties with their appropriate integrated crop and pest management practices;
- To develop techniques for improving the reclamation of seasonally flooded Vertisols;
- Develop high yielding water logging and disease resistant/tolerant crop varieties;
- Enhance the utilization of the potentials of highland Vertisols for production of high value crops;
- Evaluate the possibilities of supplemental irrigation using harvested excess water during the main season under on-farm conditions; and
- Popularize and disseminate the existing highland Vertisols technologies

### **Expected Outputs**

- Economically viable and environmentally safe double cropping system developed for Vertisols areas of the highlands;
- Remunerative best adapted high value crops promoted to farmers;
- The possibility of double cropping tef on Vertisols evaluated;
- Water harvesting technologies promoted to Vertisols areas;
- Efficient utilization of nitrogen in Vertisols areas developed;
- Agro-climatology of arid Vertisols known;
- Improved livelihoods of small holders framers;
- Wise utilization of natural resources;
- Crop productivity increased; and
- Awareness will be created about high value and market oriented crops

### ***Component I. Crop diversification and intensification on Vertisols***

#### **Crop diversification in the highland Vertisols of Ethiopia**

#### **Objective**

To test different high value crops for their adaptation on Vertisols

Implementing Centers	Locations	Responsible researchers
Holetta	Ginchi, Becho	Hailu Regassa
Debre Zeit	Akaki, Chefe Donsa, Minjar, Debre Zeit	Wakene Negassa, Yifru Abera
Kulumsa	Arsi Robe, Sagure	Birhan Abdulkadir

**Duration:** 2009-2010

### **Expected Outputs**

Crop options investigated farmers dependence on one crop will minimized, income generation due to crop diversification.

### **Double cropping on Vertisols using water harvesting structures**

#### **Objective**

To study the feasibility of double cropping on selected Vertisols areas using tef as a main season crop

Implementing Centers	Locations	Responsible researchers
Holetta	Ginchi, Becho, Dejen, Gohatsion, Debretsige, Sodo Dachi	Hailu Regassa
Debre Zeit	Akaki, Chefe Donsa, Minjar, Debre Zeit	Wakene Negassa, Yifru Abera
Kulumsa	Arsi Robe	Birhan Abdulkadir

**Duration:** 2009-2011

### **Expected Output**

The feasibility of tef- legume double cropping known, crops diversified

### **Component II: Agro-climatological features of arid and semi-arid Vertisols environment**

#### **Agro-climatological study of selected Vertisols locations in arid and semi-arid**

#### **Objective**

To implement necessary agro climatic data recording and handling systems to support improved land, water and crop management

**Location:** Arid and semi arid Vertisols environment

**Responsible researchers:** Girma Mamo

**Duration:** 2009-2010

### **Expected Outputs**

Possible crop/agronomic recommendation will be given on the out put of the finding

## **Case Team: Integrated Soil Fertility Management and Crop Productivity Improvement**

**Case team Coordinator:** Abuhay Takele

**Project Title:** Soil test-crop response based fertilizer studies for macro and micro-nutrients on major soils and crop types in Ethiopia

**Project Coordinator:** Getachew Agegnehu

### **General Objectives**

- To improve the livelihood of the farming community by providing appropriate soil fertility technologies through soil test calibration that help enhancing production as well as contributing to local and export markets with highly competitive quality products;
- To optimize the escalating cost of inorganic fertilizer use through the integration of appropriate organic fertilizer sources;
- Contribute towards yield increments (quantity and quality) of major crops under major soil types of Ethiopia;
- Increased agricultural production for sustainable livelihood of the people in the regions; and
- Increase the sustainability of the natural resources.

### **Expected Outputs**

- P status of soils for the study areas under different AEZ characterized;
- Macro and micro nutrient requirement quantitative tools for major crops under different AEZ and soil types established based on soil test based correlation and calibration data; and
- Information on optimum P and micro nutrients for major crops generated and availed to end users

## Component I: Soil test-crop response based macro nutrient requirement study

Soil test-crop response based phosphorus calibration studies for major crops and soil types in different agro ecological zones of Ethiopia

### Objectives

- To assess and evaluate the availability of P fertilizer requirement for major crops based on soil test crop response in different soil types and agro-ecologies; and
- To give quantitative guidelines and recommendations for major crops in different agro-ecologies.

Test crops	Implementing centers	Locations	Responsible researchers
Maize	Jimma	Sokoru, Tiroafeta, Omonada, Kersa, Seka, Mana, Goma, Bedele, hurumu, Mettu	Tesfa Bogale, G/silasie Hailu
	Assosa	Bambasi	Bogale walelign
	Pawe	Pawe, Manbuk, Mandura, Dibate, Bulen	Assefa Menna, Mesfin Tadesse
	Ambo	Sibu Sire, Gobu Sayo, Bako, Tibe, Ilu Gelan	Tolera Abera
	Melkasa	Meki, Ziway, Bulbula, Adamitulu	Tewodros Mesfin, Jibril Mohammed, Dejene Abera
Durum wheat	Debre Zeit	Akaki, Alemtena, Chefe Donsa, minjar, Ude	Wakene Negassa
Bread wheat	Holetta	Welmera, Ejere	Getachew Agegnehu
	Kulumsa	Bekoji	Kassu Tadesse
	Ambo	Chelia, Toke Kutaye	Tolera Abera
Malt barley	Kulumsa	Bekoji	Kassu Tadesse
	Holetta	Jaldu, Welmera	Getachew Agegnehu
Tef	Debre Zeit	Akaki, Alemtena, Chefe Donsa, minjar, Ude	Wakene Negassa
	Holetta	Ginchi, Bacho	Getachew Agegnehu
	Melkasa	Wonji, Adulala, Dhera	Hussein Harun, Tewodros Mesfin
Sorghum	Melkasa	Melkasa, Dhera,	Tewodros Mesfin, Dejene Abera
	Jimma	Melko	Tesfa Bogale, G/silasie Hailu
	Assosa	Bambasi	Bogale Walelign
	Pawe	Pawe, Manbuk, Mandura, Dibate, Bulen	Assefa Menna, Mesfin Tadesse
Faba bean	Kulumsa	Bekoji, Sagure	Birhan Abdulkadir
	Holetta	Welmera, Ejere	Getachew Agegnehu
	Debre Zeit	Akaki, Alemtena, Chefe Donsa, minjar, Ude	Wakene Negassa
Haricot bean	Melkasa,	Meki, Ziway, Bulbula, Adamitulu	Dejene Abera, Jibril Mohamed

	Pawe	Pawe, Manbuk, Mandura, Dibate, Bulen	Assefa Menna, Mesfin Tadesse
Soybean	Jimma	Sokoru, Tiroafeta, Omonada, Kersa, Seka, Mana, Goma, Bedele, hurumu, Mettu	Tesfa Bogale, G/silasie Hailu
	Assosa	Bambasi	Bogale Walelign
	Pawe	Pawe, Manbuk, Mandura, Dibate, Bulen	Assefa Menna, Mesfin Tadesse
Lentil	Debre Zeit	Akaki, Alemtena, Chefe Donsa, minjar, Ude	Wakene Negassa, Yifru Abera
Coffee	Jimma,	Seka, Mana, Goma, Gera	Solomon Endris, Jafar Dawd

**Duration:** 2009 – 2012

### **Expected Outputs**

- Soil test crop response based P fertilizer recommendations for different crops available;
- Clear information on the optimum use of N and P fertilizers for major crops and soil types available; and
- Response of different crops to N and P determined

### **Component II: Study on the micronutrient requirements of major crops**

**Zinc, Copper, Manganese and/or Molybdenum requirement study of major crops grown under different soil types**

#### **Objective**

To determine the effect and economically optimum rate of Zn, Cu, Mn and/or Mo for the production of orange and coffee under different soil types of Ethiopia

**Locations:** Melkassa (upper Awash) and Jimma

**Test crops:** Orange, coffee

**Responsible researchers:** Dejene Abera, Tesfu Kebede

**Duration:** 2009– 2010

#### **Expected Outputs**

Economically optimum rate of Zn, Cu, Mn, Fe and/or Mo for the production of orange and coffee available

**Project title: Integrated nutrient and crop management for sustainable production and productivity of major crops grown in Ethiopia**

**Project Coordinator:** Tesfa Bogale

**General Objectives**

- To develop various improved agronomic practices that would enhance yield and maintain the intrinsic quality of coffee and tea in the major coffee and tea growing agro-ecologies of the country
- To increase export diversity and the foreign exchange earnings from coffee and tea and thus improve the living standards of coffee and tea growing farmers at large, traders and other stakeholders involved in the sector, playing an active role in the poverty alleviation program of the nation.

**Expected outputs of the Project:**

- Best combinations of organic – inorganic nutrient sources that sustain soil fertility and improve crop yields identified
- Promising combination of different organic and inorganic nutrient sources verified and demonstrated
- Bean varieties suitable for maize intercropping system and optimum planting ratio of Maize –Gomenzer identified
- Economically and agronomically best-bet cropping pattern for coffee and associated food, and cash crops identified for major coffee growing agro-ecologies of the country.
- Constraints and potentials of coffee shade trees identified under small scale coffee production systems in southwest, west south and east coffee growing regions of the country.
- Fast growing coffee shade tree species identified and evaluated in the nursery and field and those promising and ideal types distributed to small scale farmers of southwest, west south and east coffee growing regions of the country.
- Appropriate training and pruning methods and spacing/population density identified for promising pipeline, and released selection and hybrid for major coffee growing agro-ecologies of the country.
- Temporary live shade trees that promote early establishment of coffee seedlings identified.
- Appropriate tea pruning cycle (techniques) developed for southwest tea growing areas of the country.
- Appropriate production technologies spacing/population density for ginger and number of nodes of cuttings for efficient propagation of vanilla recommended for southwest spice growing agro-ecologies of the country.

## Component I: Integrated Nutrient and Crop Management

### Response of different crops to integrated organic and inorganic nutrient sources

#### Objective

To determine the combined economically optimum rates of organic and inorganic fertilizers for different crops and soil types

Test crops	Implementing centers	Locations	Responsible researchers
Maize	Jimma	Melko, Seka, Menna	Tesfa Bogale, G/silase Hailu, Tesfu Kebede
	Pawe	Pawe	Assefa Menna, Mesfin Tadesse
	Assosa	Bambasi, Assoa	Bogale Waleign
Wheat	Kulumsa	Kulumsa	Amare Tadesse
Faba bean	Kulumsa	Kulumsa	Amare Tadesse

**Duration:** 2009 – 2011

#### Expected Outputs

Best combinations of organic – inorganic nutrient source rates determined

### The Effect of FYM and compost on lemon grass, mint and artimisia

#### Objectives

- To determine appropriate FYM and compost application for lemon grass, mint and artimisia production
- To evaluate agronomically optimum and economically profitable application of FYM and compost

**Locations:** Wondo Genet, Awada

**Responsible Researchers:** Haymanot Getu

#### Expected Output

Optimum FYM and compost application for lemon grass, mint and artimisia determined

### Determination of optimum spacing and the effect of FYM for stevia

#### Objectives

- To determine appropriate spacing and plant density for stevia production; and
- To determine optimum FYM application for stevia cultivation

**Locations:** Wondo Genet, Awada

**Responsible Researchers:** Haymanot Getu

**Expected Outputs**

- Optimum FYM application for stevia determined; and
- Appropriate spacing and plant density of stevia known

**Effect of plant density, planting date and harvesting interval on pima cotton development and yield in major cotton growing areas of Ethiopia**

**Objective**

To determine plant density, optimum dates of planting and harvesting for rainfed cotton at different cotton growing areas of Ethiopia

**Locations:** Werer, Gofa, Gambella, Disdesa

**Duration:** 2010-2013

**Responsible Researcher:** Berhanu Woldu

**Expected Output**

Optimum plant density, planting and harvesting date for pima cotton determined

**Determination of optimum spatial arrangement and plant population in sesame/sorghum and sesame/maize intercropping**

**Objectives**

- To determine optimum plant population of sesame in sorghum and maize intercropping systems; and
- To compare the economic returns of the component crops under sole and intercropped conditions

**Locations:** Werer, Meiso, Babile, Shewa Robit and Pawe

**Responsible Researcher:** Berhanu Woldu

**Expected Output**

Appropriate sesame/sorghum and sesame/maize intercropping pattern identified

## **Determination of plant population for newly released groundnut varieties in different agro-ecologies**

### **Objective**

To determine optimum plant density for the newly release groundnut varieties

**Locations:** Werer, Goffa, Babile, Meiso

**Duration:** 2010-2013

**Responsible Researchers:** Berhanu Woldu

### **Expected Output**

Optimum plant density for the newly released groundnut varieties determined

## **Component II: Crop diversification and Intensification studies**

### **Objectives**

- To diversify cereal, pulse and oil crops based farming system in various agro-ecologies;
- To Compare the effects of different tillage management on the performance of cereals in pulses relay intercropping;
- To intensify the production and productivity of various crops over time and area that contribute to sustain food security and export generation; and
- To generate and provide information and guideline on crop diversification and intensification to the end-users of small scale farming system

## **On-farm evaluation of intercropping of maize with gomenzer and common bean varieties**

### **Objective**

To evaluate intercropping of maize with gomenzer and common bean on-farmers fields

**Locations:** Sokoru, Tiroafeta, Omonada, Kersa, Seka mana

**Responsible Researchers:** Tesfa Bogale, G/silase Hailu, Tesfu Kebede,

### **Expected Output**

Appropriate maize/gomenzer and maize/bean intercropping practices identified.

## **Investigation on merits of intercropping grain and forage legumes in row planed sorghum**

### **Objective**

To determine agronomic and economic benefits of intercropping grain and forage legumes with sorghum

**Locations:** Sokoru, Tiroafeta, Omonada, Kersa

**Responsible Researchers:** Tesfa Bogale, G/silase Hailu, Tesfu Kebede,

### **Expected Output**

Appropriate grain and forage legumes intercropping pattern with sorghum identified

## **Intercropping Arabica coffee with enset in different areas of Ethiopia**

### **Objectives**

- To determine the effect of intercropping ratios of coffee to enset on soil moisture, situation of pests (diseases, insects and weeds) and subsequent growth, development and yield of the component crops; and
- To draw recommendations on agronomically and economically sound coffee to enset intercropping ratio for different areas

**Location:** Jimma, Tepi, Gera, Awada, Bonga

**Responsible Researchers:** Endale Taye, Anteneh Netsere

**Duration:** 2009 - 2012

### **Expected Output**

Agronomically and economically sound coffee to enset intercropping ratio that promote total land productivity, yield and quality of coffee developed for major coffee growing areas of Ethiopia

**Intercropping of coffee with Korarima (*Aframomum korrarima*) in major coffee growing areas of Ethiopia**

### **Objectives**

- To determine the biological optimum and economically payable intercropping ratio of coffee to korarima in row mixture for high yield and quality of the component crops;

- To investigate the effects of intercropping ratio of coffee to korarima on soil moisture dynamics, smothering weed growth and situation of disease and insect pests; and
- To draw recommendation on agronomically and economically sound coffee to korarima intercropping ratio for southwest Ethiopia.

**Location:** Jimma, Tepi and Gera

**Responsible Researchers:** Endale Taye, Anteneh Netsere, Tesfaye Shimber, Nigussie mekonen, Haymanot Mitiku, Girma H/michael

**Duration:** 2008-2012

### **Expected Output**

Coffee to korarima intercropping ratio that promote total land productivity, yield and quality of the component crops determined for major coffee producing areas of Ethiopia

## **Strip cropping of coffee with avocado and banana in southwest Ethiopia**

### **Objectives**

- To determine the effect of strip cropping of coffee with avocado and banana on soil moisture, situation of pests (diseases, insects and weeds) and subsequent growth, development and yield of the component crops; and
- To draw recommendations on agronomically and economically sound strip planting of coffee with avocado and banana for southwest Ethiopia.

Location: Jimma, Metu, Gera and Tepi

**Responsible Researchers:** Anteneh Netsere, Endale Taye, Tesfu Kebede, Tesfaye Shimber, Nigussie Mekonen

**Duration:** 2009 - 2013

### **Expected Output**

Appropriate planting pattern of coffee with avocado and banana that promote land productivity, yield and quality of the component crops developed for southwest Ethiopia.

## **Strip cropping of coffee with pineapple in south Ethiopia**

### **Objectives**

- To determine the effect of strip cropping of coffee with pineapple on soil moisture, situation of pests (diseases, insects and weeds) and subsequent growth, development and yield of the component crops; and
- To draw recommendations on agronomically and economically sound strip planting of coffee and pineapple for south Ethiopia.

**Location:** Awada

**Responsible Researchers:** Anteneh Netsere, Endale Taye, Tesfu Kebede, Tesfaye Shimber, Nigussie Mekonen, Taye Kufa

**Duration:** 2009 - 2013

### **Expected Output**

Appropriate planting patterns of coffee with pineapple that promote land productivity, yield and quality of the component crops developed for south Ethiopia.

## **Strip cropping of coffee with groundnut in east Ethiopia**

### **Objectives**

- To determine the effect of strip cropping of coffee with ground nut on soil moisture, situation of pests (diseases, insects and weeds) and subsequent growth, development and yield of the component crops; and
- To draw recommendations on agronomically and economically sound strip planting of coffee and ground nut for east Ethiopia.

**Location:** Mechara

**Responsible Researchers:** Anteneh Netsere, Endale Taye, Tesfu Kebede, Tesfaye Shimber, Nigussie Mekonen, Abdi Adem

**Duration:** 2009 - 2013

### **Expected Output**

Appropriate planting patterns of coffee with ground nut that promote land productivity, yield and quality of the component crops developed for East Ethiopia.

## **Intercropping coffee with food legumes, spices and root crops in different areas of Ethiopia**

### **Objectives**

- To investigate the effect of intercropping Arabica coffee with grain legumes, taro and turmeric on growth, yield and quality of coffee;
- To evaluate the effect intercropping grain legumes, taro and turmeric with Arabica coffee on land productivity and smothering of weed growth;
- To investigate the extent of soil fertility enrichment attributed by grain legumes; and
- To assess the economic benefit of intercropping coffee with grain legumes, taro, turmeric, yam and/or ginger.

**Location:** Jimma, Haru, Awada

**Responsible Researchers:** Anteneh Netsere, Endale Taye, Tesfu Kebede, Tesfaye Shimber, Nigusse Mekonen, Haymanot Getu

**Duration:** 2008 - 2011

### **Expected Output**

Recommendations on agronomically and economically sound coffee and grain legumes, spice and root crops intercropping system developed for different coffee growing areas of Ethiopia

## **Component III: Crop husbandry/management of perennial Crops**

**Survey on potentials and constraints of shade tree species for Arabica coffee production in Ethiopia**

### **Objectives**

- To identify constraints and potentials of coffee shade trees widely grown/used by small scale coffee farmers in major coffee growing areas of Ethiopia; and
- To identify fast growing and ideal shade tree species for coffee production in different areas

**Locations:** Jimma, Illubabor, West Wellega, Sidama and Gedeo zones

**Responsible researchers:** Tesfaye Shimbir, Endale Taye, Negash Eshete, Anteneh Tadesse, and Haymanot Getu

**Duration:** 2009 – 2010

**Expected outputs**

- Constraints and potentials of coffee shade trees identified under small scale coffee production systems; and
- Ideal and widely used coffee shade trees identified for major coffee growing agro-ecologies in Ethiopia.

**On-station evaluation of fast growing shade tree species: Nursery and early field evaluation in Ethiopia**

**Objectives:**

- To evaluate the performance of fast growing and ideal coffee shade tree species identified from the survey result in the respective coffee growing areas; and
- To identify promising species that would improve coffee production and productivity

**Location:** Jimma, Haru, and Awada

**Duration:** 2009 – 2011

**Responsible Researchers:** Tesfaye Shimbir, Endale Taye, Negash Eshete, and Haymanot Getu

**Expected Output**

Fast growing and ideal shade trees for sustainable improved coffee production and productivity identified for different coffee growing areas.

**Multiplication and distribution of prominent coffee shade trees in different coffee growing areas of Ethiopia**

**Objective**

To provide the small scale coffee farmers with seedlings of ideal shade trees so as to improve productivity and quality of the crop in different coffee growing areas of Ethiopia

**Locations:** Jimma, Metu, Haru, Gera, Awada, and Wonago

**Responsible Researchers:** Tesfaye Shimbir, Endale Taye, Negash Eshete, and Haymanot Getu

**Duration:** 2008 - 2011

**Expected Outputs**

- Ideal coffee shade trees that improve the production and productivity of the crop distributed to and adopted by coffee farmers in different coffee growing areas of Ethiopia; and

- To provide the small scale coffee farmers with seedlings of ideal shade trees so as to improve productivity and quality of the crop in different areas of the country.

### **Demonstration of multipurpose shade tree as a model agro-forestry system**

#### **Objective**

To establish and demonstrate a coffee-based model agro-forestry system

**Location:** Jimma

**Responsible Researchers:** Tesfaye Shimbir, Endale Taye, and Negash Eshete

**Duration:** 2008 - 2012

#### **Expected Output**

Coffee-based model agro-forestry system established and demonstrated to small scale farmers in Jimma area by year 2012.

### **Evaluation of pigeon pea, Tephrossia, Caster bean and *Sesbania sesbane* as temporary shade for transplanted Arabica coffee seedlings**

#### **Objectives**

- Determine the optimum planting density of pigeon pea, Caster bean, sesbania sesbane and Tephrosia that would promote early field establishment and growth of coffee seedlings;
- Study the contribution of pigeon pea, Caster bean, sesbania sesban and Tephrosia towards weed control and soil fertility enhancement; and
- Assess the economic benefit of using various temporary shade, viz. pigeon pea, Caster bean, sesbania sesban, Tephrosia and grass hut 'Gogo', on survival rate and growth of coffee seedlings in the field.

**Location:** Jimma

**Responsible Researchers:** Endale Taye, and Tesfu Kebede

**Duration:** 2008 - 2010

#### **Expected Output**

Temporary live shade trees that promote early establishment of coffee seedlings

### **Determination of appropriate population density and pruning methods for hybrid coffee in major coffee growing areas of Ethiopia**

#### **Objective**

To determine optimum spacing/population density and appropriate training and pruning methods that promotes yield and quality of hybrid coffee varieties

**Location:** Jimma, Gera and Tepi

**Responsible Researchers:** Endale Taye, and Nigussie Mekonen

**Duration:** 2009 - 2012

**Expected Output**

Optimum spacing/population density and appropriate pruning method determined for hybrid coffee varieties

**Determination of appropriate training and pruning practices for CBD resistant selections in major coffee growing areas of Ethiopia**

**Objective**

To determine appropriate training and pruning methods that promotes yield and quality of released CBD resistant coffee selections for different coffee growing areas of Ethiopia

**Location:** Jimma, Gera, Tepi, and Awada

**Responsible Researchers:** Endale Taye, and Nigussie Mekonen

**Duration:** 2008 - 2012

**Expected Output**

Appropriate training and pruning practices for the release CBD resistant coffee selections determined

**Determination of appropriate training and pruning practices for pipeline coffee selections for different coffee growing areas of Ethiopia**

**Objective**

To determine appropriate training and pruning method that promotes yield and quality of pipeline coffee selections for major coffee growing areas of Ethiopia

**Location:** Awada, and Haru

**Responsible Researchers:** Endale Taye, Nigussie Mekonen, Anteneh Tadesse, and Haymanot Getu

**Duration:** 2008 - 2012

**Expected Output**

Appropriate training and pruning practices for the release of coffee selection (*Angafa*) determined

## **Determination of appropriate population density and vertical number for pipeline coffee selections in western and southern Ethiopia**

### **Objective**

To determine optimum spacing/population density and vertical number that promotes yield and quality of pipeline coffee in western and southern coffee selections

**Location:** Haru, Mugi, and Awada

**Responsible Researchers:** Endale Taye, Nigussie Mekonen, Anteneh Tadesse, and Haymanot Getu

**Duration:** 2008 – 2012

### **Expected Output**

Optimum spacing/population density and vertical number determined for promising pipeline of western and southern coffee selections by 2012

## **Determination of appropriate media type for efficient propagation of tea cuttings**

### **Objective**

To determine appropriate media types for better growth and establishment of tea clones.

**Location:** Jimma

**Responsible Researchers:** Melaku Addisu, and Endale Taye

**Duration:** 2008 - 2010

### **Expected Output**

At least one best tea nursery media will be identified

## **Determination of appropriate pruning cycles promoting tea productivity under Wash-Wash and Gummer conditions**

### **Objectives**

To determine appropriate pruning techniques for better tea production in the in south west tea growing areas

**Locations:** *Gumero and Wash-wash*

**Responsible researchers:**

**Duration:** 2008 - 2013

### **Expected Output**

At least one best tea pruning technique will be identified

## **Project Title: Development of Bio-fertilizers for Major Crops Grown in Ethiopia**

**Project Coordinator:** Angaw Tsigie

## **General Objectives**

- To contribute to the national goal of food security and poverty reduction by enhancing crop and soil productivity by using bio-fertilizer technology; and
- To combat soil fertility degradation and enable small holder farming community obtain cheap source of fertilizer (bio-fertilizers).

## **Expected Outputs**

- A number of nitrogen fixing microorganisms for different food and forage crops will be available for inoculant production;
- Superior phosphate solubilizing microorganisms that can be used as biofertilizers will be available;
- Efficient micro and macro organisms that are capable of decomposing household and agricultural wastes will be available to the farming community; and
- Using biotechnological tools superior strains will be tagged will be kept as mother cultures in duplicates in laboratories such that of biodiversity.

## **Component I: Development of Nitrogen Fixing Bio-fertilizers**

**Introduction and evaluation of different nitrogen fixing strains for different food crops**

### **Objectives**

- To introduce some outstanding rhizobia, Azospirillum, Azotobacter, Klebsella, Effective Micro-organisms (EM), and test them on different major crops; and
- To evaluate the organisms for their effectiveness on crop production

**Location:** Holetta

**Responsible Researchers:** Angaw Tsigie, Amanuel Asrat, Daniel Muleta

**Test crops:** Faba bean, chick pea, and soybean

**Duration:** 2009 – 2012

### **Expected output**

Symbiotically and associatively nitrogen fixing micro-organisms obtained.

**Collection, isolation, identification, selection and evaluation of effective rhizobial strains for major pulses in Ethiopia**

### **Objectives**

- To collect available indigenous germplasm resource for selection of efficient rhizobial strains that can be used for inoculant production in the country; and
- To assess the yield increasing potentials of biological nitrogen fixation under greenhouse and field conditions.

Test crops	Implementing centers	Locations	Responsible researchers
Faba bean	Holetta	Welmera, Ejere, Degam	Angaw Tsigie, Amanuel Asrat, Daniel Muleta
	Kulumsa	Kulumsa, Sagure, Bekoji, Asasa, Kofele	Amare Tadesse
Chickpea	Holetta	Ginchi, Holetta	Angaw Tsigie, Amanuel Asrat, Daniel Muleta
	Debre Zeit	Akaki, Chefe Donsa, Minjar, Ada'a, Debre Zeit	Yifru Abera
	Kulumsa	Kulumsa, Sagure, Bekoji, Asasa, Kofele	Amare Tadesse
Soybean	Assosa	Assosa, Bambasi, Homosha, Mao'komo	Bogale Walelign
	Pawe	Pawe, Manbuk	Assefa Menna, Mesfin Tadesse

**Duration:** 2009 - 2013

**Expected Output**

Best strains that can be used for food and forage legumes production obtained.

**Scaling-up of superior Nitrogen-fixing strains**

**Objective**

To demonstrate efficient N<sub>2</sub>-fixing strains under farmers' field conditions

**Locations:** Welmera, Degem, and Kersa

**Responsible Researchers:** Angaw Tsigie, Amanuel Asrat, Daniel Muleta, and Amare Tadesse

**Test crops:** faba bean

**Duration:** 2009 - 2011

**Expected Output**

Nitrogen fixing strains for faba bean demonstrated

**Component II: Development of Phosphorus - Solubilizing Bio-fertilizers**

**Introduction and Evaluation of different P-solubilizing organisms for different crops**

**Objective**

To evaluate the effectiveness and assess the yield increasing potentials of P-solubilizers under greenhouse and field conditions

Test crops	Implementing centers	Locations	Responsible researchers
Wheat	Holetta	Welmera, Ejere	Angaw Tsigie, Amanuel Asrat, Daniel Muleta
	Kulumsa	Bekoji, Asasa	Amare Tadesse
Teff	Debre Zeit	Akaki, Chefe Donsa, Minjar, Ada'a	Yifru Abera
	Holetta	Shewa	Angaw Tsigie, Amanuel Asrat, Daniel Muleta
Faba bean	Holetta	Welmera, Degem	Angaw Tsigie, Amanuel Asrat, Daniel Muleta
	Kulumsa	Kulumsa, Sagure, Bekoji,	Amare Tadesse

**Duration:** 2009 - 2013

### **Expected Output**

At least three effective P-solubilizers are obtained

## **Component III: Development of Decomposing Organisms**

**The use of effective micro-organisms (EM) for composting and management of agricultural by-products and house hold wastes**

### **Objectives**

- To study EM efficiency in accelerating the composting process and prepare quality compost;
- To compare the nutrient content of EM-compost with conventional compost; and
- To evaluate the effect of EM-compost on crop growth and yield

Test crops	Implementing centers	Locations	Responsible researchers
Coffee	Jimma	Jimma, Awada	Tesfu Bogale
Wheat	Holetta	Welmera, Ejere	Angaw Tsigie, Amanuel Asrat, Daniel Muleta
	Kulumsa	Bekoji, Asasa	Amare Tadesse
Maize	Jimma	Jimma, Mettu	Tesfu Kebede
Tef	Debre Zeit	Debre Ziet, Chefe Dons	Yifru Abera

**Duration:** 2009 - 2012

### **Expected output**

Efficiency of EM compost on soil fertility and crop productivity determined

## The use of effective microorganisms'(EM) for management of effluent of agricultural wastes

### **Objective**

To evaluate the efficiency of effective microorganisms (EM) on reducing the pollution load from coffee pulping stations

**Location:** Jimma, and Awada

**Responsible researcher:** Tesfu Kebede

**Duration:** 2009 - 2010

### **Expected outputs**

- Efficiency of EM on coffee effluents determined; and
- Clean water, clean river and stream waters availed.

## Evaluation of vermi-compost on crop productivity and soil fertility enhancement

### **Objectives**

- To determine the efficiency of vermi-compost on crop productivity; and
- To compare vermi-compost with EM-compost and conventional compost for their quality

**Locations:** Holetta, Jimma, Kulumsa, and Ambo

**Responsible Researchers:** Angaw Tsigie, Tesfu Kebede, Amare Tadesse, and Tolera Abera

**Test crops:** wheat, maize

**Duration:** 2010 - 2012

### **Expected Output**

Efficiency of vermi-compost on crop and soil productivity determined

# **Case Team: Irrigation, Drainage and Water Harvesting**

**Case Team Coordinator:** Tilahun Hordofa

**Project Title:** Improving water productivity for sustainable soil and water management in crop production

**Project Coordinator:** Feleke Mamo

## **General Objectives**

The project should contribute to the enhancement of agricultural productivity through the application of improved agricultural technologies that promote sustainable management of soil and water resources with the ultimate aim of improving the food and livelihood security of smallholder farmers while maintaining the quality of environment.

## **Expected Outputs**

- Information on crop water requirements and irrigation water requirement for major economically important crops produced;
- The crop coefficient for major important crops identified;
- The optimal irrigation regime together with appropriate rate of fertilizer application for major important crops identified;
- Drought tolerant coffee varieties for moisture stress areas identified;
- Mechanisms of drought tolerance for different crops/varieties identified;
- Drip irrigation system and water harvesting technology adopted; and
- Livelihood improved

## **Component I: Determination of Crop Water Requirement and Evapotranspiration**

**Estimation of crop water requirement and irrigation scheduling of major crops grown in Ethiopia**

### **Objectives**

- To estimate Crop Water Requirement (CWR) for most market oriented crops under different cropping calendars in different areas of the country;
- To estimate irrigation water requirement for most economically important crops under different cropping calendars in different areas of the country; and
- To develop irrigation regimes (when and how much to irrigate) for most market oriented crops under different cropping calendars in different areas of the country

Implementing Centers	Locations	Test Crops	Responsible Researchers
Werer	Middle Awash	Groundnut, maize, onion	Fentaw Abegaz, Feleke Mamo
Holetta	Holetta	Tomato, Potato, onion	Mahtsente Tibebe
Kulumssa	Assela, Bekoji,	Potato, onion	Kassu Tadesse
Debre Zeit	Debre Zeit	Tomato, onion	Fitsum Yimanu
Melkassa	Melkassa Meki, Ziway	Sorghum, Maize	Tilahun Hordofa, Mesfin Mitiku, Daniel Bekele, Senbaba
Jima	Jimma, Awada, Mechara	Coffee, Banana, spices, root crops and Beans	Tesfaye Shimber, Eyouel Demisse, Anteneh Tadesse
Wondogenet	Wondogenet	Artemisia, lemon grass	Mulugeta Mohammed
Pawe	Pawe	Tomato, Onion, maize, sorghum	Ashabir Haile
Ambo	Ambo, Gudar	Tomato, Onion	Yohannes Kebede
Assosa	Assosa	Onion, tomato	Kaleb Ewnetu

**Duration:** 2008 - 2009

### Expected Outputs

- Information on crop and irrigation water requirements available; and
- Information on optimal irrigation regime (when and how much to irrigate) for major economically important crops under different agro-ecologies of the country produced

### Determination of crop water requirement and crop coefficient using lysimeter

### Objectives

- To estimate reference evapotranspiration, ETo;
- To determine crop water requirement, CWR; and
- To establish crop coefficient, Kc, values for major important crops

Implementing Centers	Locations	Test Crops	Responsible Researchers
Werer	Werer	Groundnut, onion	Fentaw Abegaz, Feleke Mamo
Melkassa	Melkassa	Sorghum, maize, common bean Tomato, onion,	Tilahun Hordofa, Mesfin Mitiku, Daniel Bekele, Senbaba

**Duration:** 2009-2011

### Expected Outputs

- The crop water requirement of major important crops identified; and
- The crop coefficient (Kc) for major important crops identified

## Component II: Irrigation Water and Crop Management Practices

Determination of optimal irrigation scheduling and rate of fertilizer application for major crops

### Objective

To evaluate the responses of crops to frequency, amount of irrigation and rate of fertilizer application

Implementing Centers	Locations	Test Crop	Responsible Researchers
Werer	Middle Awash	Cotton, maize	Fentaw Abegaz, Feleke Mamo
Debre Zeit	Debre Zeit	Onion	Fitsum Yimano
Melkassa	Melkassa	Tomato, onion, maize, sorghum	Tilahun Hordofa, Mesfin Mitiku, Daniel Bekele, Senbaba
Holetta	Holetta	Tomato, Potato	Mahtsente Tibebe
Assosa	Assosa, Bambasi	Maize	Kaleb Ewnetu
Wondogenet	Wondogenet	Artemisia	Mulugeta Mohammed
Kulumsa	Kulumsa	Potato, Onion	Kassu Tadesse
Pawe	Pawe	Tomato, onion	Ashabir Haile

**Duration:** 2009-2011

### Expected Output

The optimal irrigation regime and appropriate fertilizer rate application for irrigated areas identified

Evaluation of coffee genotypes for water use efficiency and drought tolerance in Hararghie, Sidamo and Wollega

### Objective

To identify drought tolerant coffee varieties for moisture stress areas

**Locations:** Jimma, Awada, Mechara, and Haru

**Responsible Researchers:** Tesfaye Shimber, Abdi Adem, Eyouel Demissie, Anteneh Tadesse, and Mulugeta Mohammed

**Duration:** 2009 - 2013

### Expected Outputs

- Drought tolerant coffee varieties identified; and
- Information on the mechanisms of drought tolerance of coffee available

### **Component III: Verification and demonstration of irrigation water management**

**Verification and demonstration of low-cost and appropriate micro-irrigation system for crop production using water harvesting techniques under smallholder farmers condition**

#### **Objectives**

- To evaluate the feasibility of drip irrigation system at the farmer’s circumstances; and
- To efficiently utilize the scarce water resources and maximize crop yield and quality at smallholder farmers conditions

<b>Implementing Centers</b>	<b>Study Sites</b>	<b>Test Crops</b>	<b>Responsible Researchers</b>
Werer	Werer, Miesso, Asaba Teferi	Onion	Fentaw Abegaz, Feleke Mamo
Holetta	Ginchi, Holetta	Tomato, Potato, onion	Mahtsente Tibebe
Kulumssa	Kulumssa	Potato, onion	Kassu Tadesse
Debre Zeit	Debre Zeit, Alemtena	Tomato, onion	Fitsum Yimanu
Melkassa	Adama, Bosset, Dodota	Tomato, onion,	Tilahun Hordofa, Mesfin Mitiku, Daniel Bekele, Senbaba
Jimma	Jimma, Awada, Mechara	Coffee, Banana, spices	Tesfaye Shimber, Abdi Adem, Eyouel Demissie, Anteneh Tadesse, Mulugeta Mohammed
Pawe	Pawe	Tomato, Onion	Ashabir Haile
Ambo	Ambo, Gudar	Tomato, Onion	Yohannes Kebede
Assosa	Assosa, Bambasi	Onion, Onion	Kaleb Ewnetu

**Duration:** 2009 -10/11

#### **Expected Outputs**

- Drip irrigation system and water harvesting technology demonstrated; and
- Information on drip irrigation and water harvesting for crop production under smallholder farmers available

# **Case Team: Integrated Watersheds Management Based on Soil and Water Conservation**

**Case team Coordinator:** Kindu Mekonnen

**Project Title:** Integrated Watershed Management Research for Sustainable Resource Use and Livelihood Improvement

**Project Coordinator:** Tesfaye Yacob

## **General Objective**

Improve the livelihood of the rural communities through integrating crop, livestock and natural resource management technologies while sustaining the natural resources base.

## **Expected Outputs**

- Common understanding about integrated watershed management created;
- Maps of representative model watersheds from five areas with different agro-ecologies, farming system and levels of land degradation;
- Biophysical, socioeconomic and institutional issues in five selected watersheds documented;
- Intervention and action plans for the priority issues in the selected watersheds prepared;
- The soil conservation potential of Vetiver grass and Nechsar hedges on farmlands and under framers management known;
- The awareness of farmers and different partners about different soil conservation measures increased;
- The effect of double post brush wood check dam, “Nechsar” and bamboo for gully rehabilitation evaluated; and
- Awareness of farmers and different partners about gully formation and its stabilization increased

## **Component I: Awareness creation, site selection, characterization and planning for integrated watershed management**

**Awareness creation and participatory site selection for integrated watershed management based research**

## **Objectives**

- To establish common understanding in integrated watershed management among different stakeholders; and

- To select representative watersheds in areas with different agro-ecologies, farming system and levels of land degradation

Characteristics of the watersheds	Implementing Center	watershed Site	Responsible Researchers
High altitude, high rainfall and mixed farming systems	Holetta	Galessa	Kind Mekonen, Bezaye Gofu, crop, livestock and forestry multi-disciplinary team
Mid altitude, high rainfall and coffee based farming	Jimma	Somodo	Tesfaye Yacob, crop, livestock and forestry multi-disciplinary team
Mid altitude, intermediate rainfall and enset based farming	Holetta	Endibir	Kindu Mekonnen, crop, livestock and forestry multi-disciplinary team
Low altitude, low rainfall and mixed farming	Melkassa	Lome	Hussein Harun, crop, livestock and forestry multi-disciplinary team

**Duration:** Six months

### Expected Outputs

- Common understanding about integrated watershed management created; and
- Maps of representative model watersheds from five areas with different agro-ecologies, farming system and levels of land degradation.

**Characterization, identification and prioritization of major constraints and potentials in the selected watersheds, and preparation of action plan for intervention**

### Objective

To characterize, identify, prioritize and analyze biophysical, socioeconomic and institutional issues, and prepare intervention and action plans for the priority issues in the selected watersheds

Characteristics of the watersheds	Implementing Center	Watershed site	Responsible Researchers
High altitude, high rainfall and mixed farming systems	Holetta	Galessa	Kind Mekonen, Bezaye Gofu, crop, livestock and forestry multi-disciplinary team
Mid altitude, high rainfall and coffee based farming	Jimma	Somodo	Tesfaye Yacob, crop, livestock and forestry multi-disciplinary team
Mid altitude, intermediate rainfall and enset based farming	Holetta	Endibir	Kindu Mekonen, crop, livestock and forestry multi-disciplinary team
Low altitude, low rainfall and mixed farming	Melkassa	Lome	Hussein Harun, crop, livestock and forestry multi-disciplinary team

**Duration:** Six months

### Expected Outputs

- Biophysical, socioeconomic and institutional issues in five selected watersheds documented; and
- Intervention and action plans for the priority issues in the selected watersheds prepared.

## Component II: Soil conservation and gully rehabilitation

### Soil and water conservation through vegetative measures on farmlands

#### Objectives

- To evaluate the soil conservation potential of Vetiver and Nechsar grass hedges on farms owned by group of farmers; and
- To enhance the awareness of the farming communities and other partners about different soil conservation measures.

Implementing Center	Locations	Responsible Researchers
Pawe	Pawe	Fikadu Getnet
Jimma	Haru	Tesfaye Yacob
Assosa	Bambasi	Yared Shumete

**Duration:** 2010-2012

#### Expected Outputs

- The soil conservation potential of Vetiver grass and Nechsar hedges on farmlands and under farmers management known; and
- The awareness of farmers and different stakeholders about different soil conservation measures increased.

### Community based participatory gully rehabilitation with brush wood check dams and vegetative resources

#### Objectives

- To evaluate the effect of double post brush wood check dam, “Nechsar” and bamboo for gully rehabilitation; and
- To increase the awareness of farmers and different stakeholders about gully and its stabilization.

**Location:** Pawe, Manbuk, Assosa, and Sulga-22

**Responsible Researchers:** Fikadu Getnet, and Yared Shumete

**Duration:** 2009 – 2011

#### Expected Outputs

- The effect of double post brush wood check dam, “Nechsar” and bamboo for gully rehabilitation evaluated; and
- Awareness of farmers and different partners about gully formation and its stabilization increased.

## Externally Funded Projects

### Efficient nutrient supply in east Africa

**Project Coordinator:** Getachew Agegnehu

#### General objectives

Improve the livelihood of the farming community through the dissemination of appropriate integrated soil fertility management technologies that help to boost crop production and productivity, thereby increasing its contribution to food security, and improve the quality and quantity of local and export commodity markets, while sustaining the natural resource base.

#### Specific objectives

- Review and document promising soil and water management practices conducted in Ethiopia and avail to end users;
- Adapt, demonstrate and scale up proven ISFM technologies for maize, wheat and tef based cropping systems;
- Study soil test based crop response to fertilizer and quantify nutrient balance in maize, wheat and tef based cropping systems;
- Improve and strengthen the capacity of farmers, researchers and extensionists in ISFM; and
- Provide information on ISFM to policy makers based on economic and biological evaluations of ISFM practices.

**Locations:** Holetta, Jimma, Pawe, Assosa, and Melkassa

**Responsible Researchers:** Getachew Agegnehu, Solomon Endris, Assefa Menna, Bogale Walelign, and Tewodros Mesfin

**Test Crops:** Wheat, teff, maize

**Duration:** 2009-2011

**Donor:** Government of the Netherlands

### Evaluation and Scaling-up of New Chemical and Biological Commercial Products for Improving and Sustaining Crop Yields in Selected Agro-Ecological Zones in Sub-Saharan Africa

**Project Coordinator:** Amanuel Asrat

#### General objectives

To assess the effectiveness of several commercial agricultural products and seed technologies developed by private companies to optimize and sustain crop yields in diverse agro-ecological zones in SSA. Following a rigorous and in-depth scientific appraisal, the research will unravel underlying mechanisms and investigate the level of

interactions between the effects of the application of the two most effective products screened under controlled conditions. These effective products will be scaled up under field conditions integrated within ISFM components (fertilizer application, soil organic matter, microbial ecology, adjusted cropping practices and crop varieties)

The project consists of five objectives

**Objective i: Baseline information and site selection**

To select sites, collect baseline information, characterize new products, and evaluate data obtained from trials conducted by the private companies

**Objective ii: Screening of new products and technological options**

To screen a large number of new products on some key crops such as maize, wheat, soybean, haricot bean and banana under greenhouse conditions, followed by a field evaluation of effective products and an investigation of their capacity to increase crop yield across target agro-ecozones, land intensification and soil fertility gradients, including fields that are responsive to fertilizer and those are not, as a basis for integrating these into ISFM technologies.

**Objective iii: Understanding mechanisms and contributions**

To unravel mechanisms underlying adaptation and contributions of the two selected products and their combinations to crop performance and yield persistence in various target cropping systems across the target agro-ecozones, land intensification and soil fertility gradients.

**Objective iv: Making effective products available at scale**

To foster dissemination of effective new agricultural products beyond the experimental sites through a cycle of demonstration and farmer-managed adaptation trials in the target areas. This objective will initiate activities that could potentially be further developed in a Phase II proposal that BMGF may fund at 1.5 – 2 years into the program for expanding commercial scale up, formulations, field development or field dissemination of technologies in different countries. This preliminary activity should be done in accordance with community extension programs associated with development.

**Objective v: Project management, capacity building, and monitoring and evaluation**

To operationalizing a continuous monitoring and evaluation framework as a basis for ensuring that the desired outputs are produced, and explore and develop pathways for commercialization of effective products. Several students (Master and PhD) will be trained in the field of biological materials, soil inoculants and soil microbiology. Currently, national research capacity is limited but crucial to achieve success. Gender issues will be taken into consideration in the selection of the students for both Master and PhD. This will be done closely in relation with the Project funded by BMGF and coordinated by the Gender and Diversity program of CGIAR.

**Locations:** Holetta, Debre Zeit, Kulumsa, Jimma, and Pawe

**Responsible Researchers:** Amanuel Asrat, Daniel Muleta, Yifru Abera, Amare Tadesse, G/selassie Hailu, and Mesfin Tadesse

**Test crops:** Faba bean, chickpea, soybean, haricot bean, wheat, and maize

**Duration:** 2009-2011

**Donor:** Bill and Melinda Gates Foundation, CIAT-TSBF

## **Efficient Use of Crop Residues: Animal Feed versus Conservation Agriculture**

**Project Coordinator:** Angaw Tsigie

### **General Objectives**

To enhance sustainable productivity, value addition and competitiveness of the regional agricultural system

### **Expected Outputs**

- Best-bet options for the utilization of crop residues recommended;
- Institutional capacity building and structures that promote utilization of best-bet options of crop residues strengthened; and
- Uptake of best-bet options for utilization of crop residues facilitated

**Locations:** Holetta, and Degam

**Responsible Researchers:** Angaw Tsigie, Agajie Tesfaye, Fekede Feyisa

**Duration:** 2009-2010

**Donor:** Association for Strengthen Agricultural Research in Eastern and Central Africa (ASARECA)

## **Managing risk, reducing vulnerability and enhancing agricultural productivity under a changing climate**

**Project Coordinator:** Habtamu Admasu

### **Objectives**

- To enhance the overall knowledgebase on impacts of climate variability and associated physical and economic vulnerabilities;
- To develop “Decision aides” that support strategic and tactical decision making in selecting appropriate responses to manage risks and capitalize on opportunities created by variable climate;
- To evaluate the impacts of climate change on vulnerability of agricultural systems and assess the adequacy of the current management options and adaptation strategies to effectively meet the challenges; and
- To enhance the operational and technical capacity of national institutions to develop and disseminate regularly updated climate knowledge, products and adaptation plans

**Locations:** Melkassa

**Responsible Researcher:** Habtamu Admasu

**Duration:** 2009-2010

**Donor:** International Development Research Center (IDRC)

## **Optimal soil-water-crop management for increasing sorghum productivity in the Central Rift Valley of Ethiopia**

**Project Coordinator:** Tewodros Mesfin

### **General Objectives**

- To extensively demonstrate tie-ridging technology and the implement under farmer's condition;
- To explore the different combination of tillage, crop row configuration and identify the best-bet options as a means of maintaining yield reliability and profitability in the sorghum-based cropping system with unreliable rainfall conditions of Ethiopia;
- To test whether APSIM-sorghum model would enable to simulate sorghum crop grown in different crop-row configuration and tillage management using long-term whether record against limited field experiments establish and possibility to extend these findings both qualitatively and quantitatively across different soil types and rainfall regimes;
- To test and validate APSIM model to simulate sorghum crop grown under different crop-row configuration;
- To evaluate the effect of different time of tie-ridging application, fertilizer rate and their interactive effect on soil moisture retention, water use efficiency and sorghum yield;
- To evaluation of skip-row as a means to increase water availability during grain filling stage in the drought affected sorghum-based cropping system;
- To conduct training for field extension staff and support their promotion of tie-ridging;
- To promote tie-ridging and evaluation of skip-row planting for yield reliability on the farmers fields; and
- To provide fund for short-term training and host a visiting scientist to learn more about their research experience

**Locations:** Melkasa, and Meiso

**Responsible Researchers:** Tewodros Mesfin, Mezgebe Getinet, and Habtamu Admassu

**Duration:** 2009-2011

**Donor:** International Sorghum and Millet (INSORMIL)

## **Making the best of climate – Adapting agriculture to climate variability**

**Project Coordinator:** Habtamu Admasu

## **General Objectives**

- To enhance the understanding about the impacts of climate variability on the agricultural systems in semi-arid tropics;
- To develop and promote farm-level response options that will reduce the impacts of climate variability and enhance productivity;
- To improve farm level risk management through provision of climate information products that support strategic, tactical and operational decision making by farmers;
- To build the capacity of farmers and their support agents to develop and apply locally relevant climate information products that assist in making the best use of existing climate while creating awareness and preparing for the possible impacts of climate change; and
- To promote formal and lasting institutional linkages within and across counties that facilitate the dissemination and utilization of the knowledge base and experiences

**Locations:** Melkassa

**Responsible Researchers:** Habtamu Admasu, Dejene Abera

**Duration:** 2009-2010

**Donor:** Association for Strengthen Agricultural Research in Eastern and Central Africa (ASARECA)

## **Up scaling of soil/water management technologies for increased maize productivity in Eastern and Central Africa**

**Project coordinator:** Habtamu Admasu

### **Objectives**

- To facilitate the uptake of proven soil and water management technologies with drought tolerant maize varieties in drought prone areas of Tanzania, Kenya and Ethiopia;
- To strengthen the capacity for enhancement of promotion and utilization of soil and water management technologies with drought tolerant maize varieties in the region; and
- To enhance availability of knowledge and information on soil and water management technologies with drought tolerant maize varieties to uptake pathways in the region

**Location:** Melkassa

**Responsible Researchers:** Habtamu Admasu, Dagne Wagari, and Hussein Harun

**Duration:** 2010

**Donor:** Association for Strengthen Agricultural Research in Eastern and Central Africa (ASARECA)

## **Going to Scale: Enhancing the Adaptive Management Capacities of Rural Communities for Sustainable Land Management in the Highlands**

### **General objectives**

To improve agricultural productivity and increase rural income and food security from sustainable utilization of agro-based natural resources in the highlands of eastern Africa

### **Specific objectives**

- Identify and promote appropriate strategies to accelerate uptake of pilot tested SLM innovations and provide an evidence-based framework for their effective scaling up;
- Develop partnership mechanisms for linking grassroots planning with district level decision-making and policy implementation for landscape level SLM innovations adoption and impact;
- Provide insights for evidence-based policy options that address key barriers and opportunities for wide scale adoption of SLM innovations in the selected districts.
- Develop, implement and evaluate a systematic strategy for devolution of structures and action research responsibilities to national partners in the selected countries; and
- Promote and adapt iterative knowledge management and communication systems needed for scaling out/up SLM innovations.

**Locations:** Dandi and Wera Jarso Weredas

**Responsible Researchers:** Kindu Mekonnen, Bezaye Gorfu and multi-disciplinary teams

**Duration:** 2009-2013

**Donor:** International Development Research Center (IDRC)

## **Evaluation of different Timac Agro slow release fertilizer products on yield and yield components of cereal crops in Ethiopia**

**Project coordinator:** Getachew Alemu

### **General objectives**

- Evaluate the relative contribution of slow release nitrogen and compound fertilizers on maize yield and yield components
- Evaluate changes on soil chemical properties due to the application of slow release nitrogen and compound fertilizers
- Evaluate the economic feasibility of the products and recommend economic doses of the products to the end users

**Locations:** Holetta, Jimma, Mettu, Bako, Kulumsa, Debre Zeit

**Responsible Researchers:** Getachew Alemu, Tesfa Bogale, Birhan Abdulkadir, Yifru Abera

**Duration:** 2010

**Donor:** Timac AGRO Italia

**Feasibility study for the use of biochar to enhance soil fertility and capture carbon in Ethiopia**

**Project Coordinator:** Wakene Negassa

**General objectives**

- To determine the functionality of the fresh biochar through chemical and physical characterization, wet chemical and molecular analyses, scanning electron microscopy, pyrolysis techniques, and additionally total and available nutrient and trace element content will be determined; and
- To determination of the effect of biochar application on soil functions and biomass production (BGR, INRES, CSS, BRC)

**Locations:** Debre Zeit, and Jimma

**Responsible Researchers:** Wakene Negassa, Tesfaye Shimbir

**Duration:** 2010-2011

**Donor:** Federal Institute for Geosciences and Natural Resources, Germany

**Evaluation of Haifa bonus NPK + ME and package testing for bread wheat production on different crops**

**General objectives**

- To study the effect of using full package inputs on the grain yields of bread wheat; and
- To improve the livelihood of the farming community through providing appropriate full package technologies that help to boost wheat production.

**Locations:** Kulumsa (wheat), and Jimma (tea)

**Responsible researchers:** Kassu Tadesse, Birhan Abdulkadir, Amare Tadesse, Solomon Endris

**Duration:** 2010

**Donor:** Axum Greenline Trading Plc.

**Evaluation of nutribor, nutrimix, fertilon, solugran, and basacote on different crops**

**General objectives**

- to test the safety and effectiveness of different COMPO fertilizer products on major crops grown in Ethiopia; and
- to determine economic feasibility of the new fertilizers products from COMPO as compared to recommended NP fertilizer application

**Locations:** Jimma, Holetta, Melkassa, and Kulumsa

**Responsible Researchers:** Tesfa Bogale, Temesgen Desalegn, Dejene Abera, Tesf Kebede, Birhan Abdulkadir

**Test crops:** Maize, wheat, potato, tomato, and coffee

**Duration:** 2010

**Partner:** Qoricha Plant and Health Requirement Export-Import Pvt. Ltd.

### **Evaluation of SKAF and Bnbat fertilizers on different crops**

#### **General Objectives**

- To test the effectiveness of SKAF and Bnbat fertilizers on productivity of different crops;
- To compare its effectiveness with recommended N/P fertilizer and integrated nutrient sources; and
- To estimate its economic advantage compared to other fertilizer sources.

**Locations:** Holetta, Jimma, Kulumsa, and Pawe

**Responsible Researchers:** Getachew Agegnehu, Tesfa Bogale, Birhan Abdulkadir, Assefa Menna

**Test crops:** Wheat and maize

**Duration:** 2010

**Partner:** Ambasel Trading House Pvt. Ltd. Co.

### **Evaluation of vermiculite as a growing media for commercial flower farms in Ethiopia**

#### **General objectives**

- To evaluate the use of vermiculite as a growing media for flowers; and
- To compare the performance of vermiculite with other growing media (cocoa and redash).

**Locations:** Holetta and Debre Zeit flower farms

**Responsible Researchers:** Hailu Regassa, and Getachew Agegnehu

**Duration:** 2010

**Partner:** Ezana Mining Development