LEGUME RESEARCH NETWORK PROJECT NEWSLETTER

KENYA AGRICULTURAL RESEARCH INSTITUTE
P.O. BOX 14733, NAIROBI, TEL. 254-440935, FAX 254-449810
E-MAIL Address: jmureithi@net2000ke.com

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ABOUT THE NEWSLETTER

Welcome to the first issue of the Legume Research Network Project (LRNP) newsletter. This newsletter was initiated to provide a forum for highlighting Network activities and sharing its research findings with other projects involved in similar work in Kenya. This inaugural issue highlights research activities conducted in the network's eleven sites spread across the country and covering major agro-ecological zones. The newsletter will also publish short articles on legume research, especially those based on research aimed at integrating legumes into smallholder agriculture. Announcements of important events like meetings, workshops and conferences will be published in the Newsletter. This is a biannual newsletter and will be published in June and December. Your constructive comments on this first issue are welcome and they can be addressed to D.M.G. Njarui, the Editor, LRNP or Joseph G. Mureithi, LRNP Coordinator, P.O. Box Nairobi(email jmureithi@ net2000ke.com

IN THIS ISSUE

THE LEGUME RESEARCH NETWORK PROJECT (LRNP)

Introduction

The productivity of smallholder farms in many parts of Kenya is low and one of the major causes is the decline in soil fertility. The problem of declining soil fertility in these farms is rampant mainly because of continuous cultivation and little use of inorganic fertilizers. High costs of fertilizers and their erratic availability limit their use. The green manure/cover crop (GMCC) legumes offer a potential option for maintaining soil fertility to the farmers. This is because the costs involved in utilizing green manure technologies are minimal, the legumes add nitrogen to the soil, also add organic matter that improves soil physical characteristics and provides soil cover that reduces soil loss by checking runoff. Besides, some green manure legumes are nutritious feeds for livestock that are high in nitrogen and some others are food for human beings.

This Network was formed in 1994 as a Legume Screening Network (LSN) to primarily evaluate and identify suitable legume species for the different region in Kenya and eventually incorporate the best bets in the existing farming systems. Since then, the Network has expanded its activities from mere screening of legume to agronomy, evaluation of grain legumes such as cowpea and pigeon pea, seed bulking as well as livestock feeding studies. As a result of this expansion the LSN changed its name recently to Legume Research Network Project which reflects the range of activities it's involved in. The LRNP covers 11 sites spread across the country from the Coastal region to Western Kenya (Figure 1) and covers major agro-ecological zones (Table 1). The Network is mainly funded by the Rockefeller Foundation

(RF) and Kenya Agricultural Research Institute (KARI) and it is housed by KARI at the National Agricultural Research Laboratories (NARL).

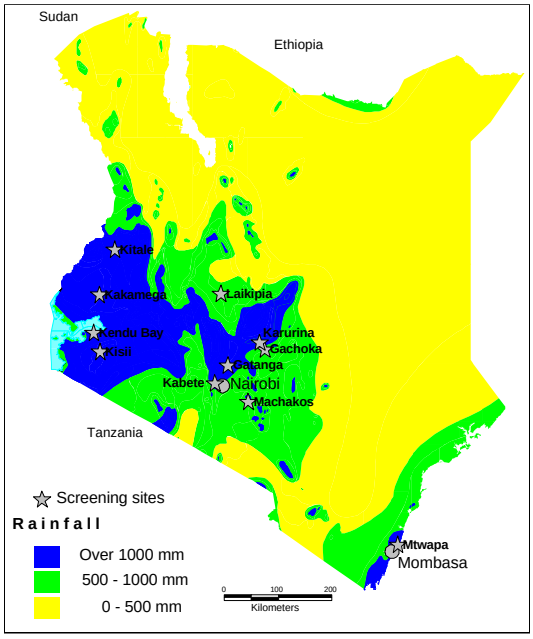

Figure 1. Location of Legume Research Network sites

Table 1. Characteristics of LRNP sites

Site name	Elevation (masl)	Annual rainfall (mm)	Soil type
Kendu Bay	1190	1130	vertisol/ ferrasol
Kisii	1750	2000	nitisol
Kakamega	1560	1800-2000	nitisol
Kitale	1890	1000-1200	ferrasol
Laikipia	1842	600	vertisol
Karurina	1280	1100	nitisol
Gachoka	1070	950	ferrasol
Gatanga	1500	1100	ferrasol
Kabete	1700	980	nitisol
Machakos FTC	1600	750	luvisol
Mtwapa	15	1200	acrisol/luvisol

Membership

The Network members come from KARI, University of Nairobi (UoN), Environmental Action Team (EAT, an NGO based in Kitale) and Community Mobilization Against Desertification (C-MAD, an NGO based in Rongo near Kisii). Dr. J.G. Mureithi, a KARI/Rockefeller Foundation Career Fellow is the Coordinator of the Network. The main collaborators are the staff of the Ministry of Agriculture, Livestock Development and Marketing, and the farmers in different regions of Kenya. Currently the membership is limited to those members who receive direct support from the RF to conduct Network activities. Discussions are underway to open membership to other scientists involved in similar projects in the country.

Goal of the Network

Promote the use of green manure/cover crop legumes in improving productivity of smallholder farms and in conservation of the environment.

Broad objectives

- identify a range of legumes that are adapted and productive in various specific climatic conditions;
- conduct research to support the local farmers to integrate the identified legumes into their farming systems;
- bulk seeds of the promising best bet legumes in the different agro-ecological zones to alleviate seed shortage.

HIGHLIGHTS OF NETWORK ACTIVITIES

I: Summary of Completed Research

a) *Screening Herbaceous Legumes for Soil fertility Improvement*

About 40 legume species were screened in the 11 sites of different climate characteristic in Kenya for a period of 2 years. The criteria for selection was based on biomass production, nodulation and nitrogen fixation, ground cover, pest and disease resistance. The most outstanding legumes (Table 2) across the sites were velvet bean, lablab, sunnhemp and jackbean. The selected legumes are currently being evaluated under farmers' condition to determine the best way to integrate them into the smallholder farming systems.

Table 2. Some of the best bet legumes for different Regions of Kenya

Region	Mean annual rainfall (mm)	Best bet green manure legumes
Coastal lowlands (Mtwapa)	1200	Velvet bean (*Mucuna pruriens*), Jackbean (*Canavalia ensiformis*), Lablab (*Lablab purpureus*),Clitoria (*Clitoria ternatea*) Siratro (*Macroptilium atropurpureum*)
Semi-arid eastern Kenya (Machakos)	750	Velvet bean, Jackbean, Lima bean (*Phaseolus lunatus*), Cowpea (*Vigna unguiculata*), Glycine (*Neonotonia wightii*)
Central highland (Kabete and Gatanga)	1100	Velvet bean, Lablab, Lima bean, Desmodium (*Desmodium intortum*) Sunnhemp (*Crotalaria ochroleuca*)
Eastern highland (Embu - Karurina)	1100	Velvet bean, Sunnhemp, Lablab, desmodium, Glycine
Lower Embu - Gachoka	950	Velvet bean, Lablab, Sunnhemp, cowpea
Mt Kenya rain shadow side - Laikipia	600	Velvet bean, dolichos, lima bean, glycine
North Rift Valley (Kitale)	1200	Velvet bean, Lablab, Jackbean, Sunnhemp, Desmodium
Western Kenya (Kakamega)	1800-2000	Velvet bean, Lablab, Jackbean, Sunnhemp, Soybean
Nyanza (Kisii)	2000	Velvet bean, Lablab, Jackbean, Sunnhemp
Lake Victoria Basin (Kendu Bay)	1130	Velvet bean, Lablab, Jackbean, Sunnhemp, Soybean

b) Effect of Rhizobia inoculation on performance of selected legumes

Because majority of farmers in Kenya do not inoculate legumes seed at planting for various reasons, a study was initiated to assess the importance of inoculating seed with *rhizobia*. Eighteen legumes were selected including those with a wide agro-ecological adaptation such as velvet bean, jackbean, lablab and sunnhemp. The study was conducted in 10 sites across Kenya at the beginning of the long rains in 1997. Each legume was inoculated with appropriate *rhizobia* and fertilized with P. Strict procedures were followed during inoculation, at planting and at sampling of nodules to avoid contamination of seed and individual plots. Total number and effective nodules per plant were assessed two months (early) and four months after planting (late). It was found out that most of the legumes did not respond to inoculation in all sites. Further investigation to characterize the indigenous *rhizobia* in all sites surprisingly revealed low levels of native *rhizobia*, which was not supported by the performance of the legumes. It was concluded that further systematic studies on the characterization of the native rhizobia should be undertaken including ascertaining the levels in the soil.

c) Legume species screening for performance under low soil P condition

The objective of this study was to evaluate the legume species with potential for use as green manure and assess their response to P in Kakamega and Kabete. The trials were established at RRC, Kakamega and NARL, Kabete during the LR 1998 season. Six

legumes were selected for the Kakamega site and they included sunnhemp, calopo (*Calopogonium mucunoides)*, lablab, jackbean, velvet bean and soybean (*Glycine max*) cv. SCS-1. For Kabete site only three legumes were selected; velvet bean, sunnhemp and purple vetch. In Kakamega, biomass production and nodulation performance with application of 30 kg/ha P and without application of P was assessed three months after planting. Sunnhemp, lablab and soybean had higher biomass accumulation with application of P than without P but this was not significant. Calopo, jackbean and velvet bean did not show any response to P on biomass production. Increased nodulation were recorded with application of P than without P but this was not significantly different. At the Kabete site response of the legumes to three levels of P; 0, 20 and 40 kg P ha^{-1} were assessed five months after planting. Application of P at the rate of 20 kg ha^{-1} increased biomass yield of velvet bean from 1.9 to 3.3 t ha^{-1}, that of sunnhemp from 0.2 to 0.7 t ha^{-1} and purple vetch from 0.5 to 1.4 t ha^{-1}. The legumes did not respond substantially to application of P at a higher rate than 20 kg ha^{-1}. From these results its clear that response of legume species to P is site specific and plans are underway to have each site conduct P response trials with its best legume species.

d) Potential of Jackbean as a feed supplement for Kenya Dual Purpose Goat (KDPG)

Poor nutrition limit livestock productivity in semi-arid eastern Kenya especially during the dry season. One way to improve productivity is to supplement with the available feed with high quality protein and energy. However, commercial concentrates can be used but they are too expensive for the small-scale farmers. In an effort to search for cheap, high-quality protein and energy feed, ground seed of jackbean (Jackbean meal) were used as supplement to KDPG bucklings during the dry season between June and September 1997 at KARI, Katumani. Sixteen young bucklings were stratified according to weight into four groups and randomly allocated to four types of feed supplement (jackbean, leucaena leaf meal, commercial concentrate and no supplement) which were offered on daily basis for a period of 84 days. Leucaena leaf meal and commercial concentrate were used for comparison. The goats were weighed weekly to determine weight change. It was found out that jackbean meal had toxic effect on the goats and resulted to loss of weight (17.88 g/day) and death. Jackbean has some an anti-nutritive factor that depresses growth. However treatment by boiling or roasting at high temperatures has been suggested as a mean of detoxifying the seed but the energy cost is high and therefore not viable to majority of the small-scale farmers in the region.

II: Ongoing Research Activities

(see Table 6 for responsible scientists)

a) Legume residue management study

The main goal of the study is to develop management practices for incorporating green manure legumes in smallholder cropping systems. Three methods of residue application are being assessed; incorporating the legume biomass, slashing and leaving the residue on the surface as mulch and removing the slashed legume biomass. The last treatment will assist in assessing the value of below ground legume biomass on crop production. One of the important parameter to be monitored is the labour requirement for each of the methods as this is a critical factor in smallholder farming. Other parameters to be monitored relate to soil properties and crop performance including the legumes. This activity is being conducted at five Network sites where maize production is an important component of the farming systems. The sites are **Machakos, UoN-Kabete, Gatanga, Kitale and Kisii** and the research is conducted at both on-station and on-farm in collaboration with farmers. Prior to planting of maize, the legume residue from the previous season are either incorporated into the soil or removed completely or left as surface mulch. In addition, a pure stand of maize, with and without fertilizer is planted to serve as control. Most of the legumes used at different sites are common and are listed in Table 3.

Table 3. Legume in the residue management trials

Evaluation site	Legumes used
Machakos	Lima bean, Sunnhemp and Velvet bean
Kabete	Sunnhemp, Purple Vetch and Velvet bean
Kitale	Velvet bean
Gatanga	Sunnhemp and Velvet bean
Kisii	Sunnhemp and Velvet bean

In **Machakos** the biomass yield of lima bean, sunnhemp and velvet bean averaged 1, 3 and 4 t DM ha^{-1}, respectively. Increased maize yield was recorded during the LR 1998 season in plots with the legumes. The plots that were mulched with velvet bean had the highest amount of grain yield, 4 t ha^{-1} . This was attributed to moisture conservation rather than improved soil fertility. At **Kabete** average biomass production was 2 and 11 t DM ha^{-1} for purple vetch and velvet bean, respectively. This was the biomass available for the trial. Maize grain yield was highest where the residue was incorporated in soil and lowest where the residue was removed. Incorporating sunnhemp increased grain yield by more than 100% (3.62 t ha^{-1}) compared with the control (1.76 t ha^{-1}). This experiment was repeated during the SR 1998 season but failed due to poor rainfall at both sites.

The work of EAT in **Kitale** involved use of velvet bean and maize stover as crop residue. The mean legume yield prior to planting maize was 6.4 t DM ha^{-1}. Maize yield where legume biomass was present as part of the residue was 5.7 t ha^{-1} which was significantly higher by 40% than where legume biomass was removed. There was no significant difference between the yield of maize from plots where legume biomass was left on the surface as mulch compared to where it was incorporated.
The study at **Gatanga** involved 19 farmers. The mean legume biomass yield was 0.6 t DM ha^{-1} for sunnhemp and 2.5 t DM ha^{-1} for velvet bean. Initial result for the LR 98 indicated that maize grain yields in plots where sunnhemp and velvet bean biomass were incorporated was 2.5 and 2.0 t ha^{-1}, respectively. These yields were 66% and 120% higher than where biomass was left as mulch. Maize yields from plots where legumes biomass was removed were low (about 1 t ha^{-1}) and were not any better than control plots (no inputs).

In **Kisii** site the study is conducted both on-station at the KARI Centre's farm and on-farm in Nyamira. Twelve farmers are involved in the on-farm site. Preliminary results from the on-station site did not reveal significant differences between the legume residue management treatments. However, incorporating the legume residues into the soil gave, on average, higher maize grain yields (6.4 t ha^{-1}) than using the residue as mulch (5.6 t ha^{-1}). Maize grain yield from the control plot without legume and fertilizer) was half that of plots where velvet bean biomass was incorporated into the soil. Like the on-station study the on-farm trials did not show significant differences between treatments.

b) Integrated nutrient management (INM) studies

The combined use of inorganic and organic sources of plant nutrients can be a sustainable way of maintaining soil nutrient supply and hence improve crop performance.

Table 4. Legumes used for the integrated nutrient management trials

Evaluation site	Legumes used
Kakamega	Sunnhemp and Velvet bean
Embu	Sunnhemp and Velvet bean
Mtwapa	Lablab and Velvet bean

This study was initiated to test the effectiveness of different combination of legume green manure, organic (compost/farm yard manure) and inorganic fertilizers in improving maize yields. Effects of these treatments on soil fertility were also assessed.

The study is being carried out at three KARI centre, **Kakamega, Embu** and **Mtwapa** both on-station and on-farm. During the first season, legumes (Table 4) are planted as intercrop with maize to provide material for incorporation in the soil. The treatment combinations of legume residue, organic and inorganic nutrients are applied in subsequent season.

In **Kakamega** 20 farmers from Lukume, Mahira and Chemche in Kabras Division are participating in this study. The legumes were planted in mid October during the SR 1997 and then cut and incorporated in February 1998. The other combinations of organic and inorganic fertilizer (N) were applied thereafter and maize planted. Inclusion of legume in combination with either organic or inorganic fertilizer resulted to higher yield of maize grain than where there were other combinations. At the on-station site, mean maize grain yield responses to sunnhemp and velvet bean were 0.8 and 1.0 t ha^{-1} respectively higher than other treatments without legume. There were no significant responses to the other main factors; farm yard manure (FYM) and inorganic fertilizers. Results from on-farm study indicated that treatments combining legume residue with either FYM or inorganic-N had between 0.9 and 1.2 t ha^{-1} higher grain yield than the farmer practice which gave a yield of 2.2 t ha^{-1}. Farmers ranked the treatments where a legume was included to be the best.

In **Embu,** 20 farmer were selected, 10 in Karurina and 10 in Gachoka. The results from on-farm trial at Karurina (wetter site) revealed that grain yield was higher (6.48 t ha^{-1}) in treatments where legume residues (velvet bean or sunnhemp) was used as a source of N. The yield was 27%, 37% and 6% higher than where animal manure, inorganic fertilizers alone, and combination of legume and inorganic fertilizer were used, respectively. At Gachoka (drier site) yield of maize were similar under different source of N. The on-station experiment showed that no single source of N proved to be superior to the others; this was attributed to the relatively high level of initial soil fertility.

At **Mtwapa**, the organic sources of N did not show any significant effect on maize grain yield during the LR 1998. On the contrally, application of at least 15 kg N ha^{-1} increased maize grain yields significantly. Velvet bean and lablab caused a slight depression in maize yields, about 10% and 8% respectively. This experiment was repeated during the SR 1998 season but the crop failed due to poor rainfall.

c) Effect of green manure legumes on control of striga in south Nyanza

This study is being conducted by C-MAD in the lower potential zone of south Nyanza in smallholder farms. The study aims at using the legumes; sunnhemp, lablab and velvet bean to reduce striga infestation, improve soil fertility and subsequently increase maize yields. A rotational system is practiced where the legumes are planted in one season and their biomass incorporated in the soil before planting maize in the following season. Striga infestation is monitored by counting the striga seeds that have germinated. Results from 1996 and 1997 work revealed that plots where the legumes were planted had on average 10 striga count m^2 while the control plot had 32 striga counts m^2. These initial results indicate that the legumes have a deterrent affect on striga germination. On average maize grain yield was 2.4 t ha^{-1} in plots where legume was planted compared to 1.4 t ha^{-1} in control plots.

d) Participatory cowpea varietal screening trial

Cowpea is one of the important pulse for the coastal people and it has a high protein content of between 23% - 35%. The grains are used for making various dishes while the leaves are used as vegetable. However, yields of this crop at the coast is low. In an attempt to avail high yielding cowpea varieties to coastal farmers several varieties were screened for their adaptability and productivity at RRC, Mtwapa. Nine lines were selected on the basis of leaf and grain yield for further screening on-farm. These were K80, 410-1,273-2-1, 2271-5, 286-13, 573-1, 1088-4, 453-3 and 129-4. Twenty one farmers from Mwatate and Samburu were selected to evaluate these cowpea varieties. A local variety was also included to act as a check. Planting was

carried out during the LR 1998 season between April and June. Average grain yield ranged from 0.49 t ha^{-1} for the local variety to 1.18 t ha^{-1} for K80. This evaluation will be repeated with more farmers in Samburu, Kaloleni and Kikambala in 1999 and will concentrate on the grain types.

e) Livestock feeding studies

Introduction

Various legumes that are either used for green manure residue or INM studies by the network are also assessed at Katumani and Mtwapa for their value as livestock feed. Also the seasonal variation of nutrient composition of these herbaceous legumes is monitored during the growing period in all the sites.

i. The Role of herbaceous legumes for livestock production in Coastal Kenya

The objectives of this study are to determine the quality of selected herbaceous legumes as livestock feeds and use them to improve the nutrition and productivity of dairy animals. Adapted and productive legumes are sampled at 3 and 6 months after planting for nutritive value determination. The analysis will show when the quality is highest and assist to decide on the most suitable stage for feeding. The legumes will be bulked and fed to lactating cows as supplements to determine their affect on milk production. Already four legumes; velvet bean, clitoria, calopo and lablab have been sampled for quality analysis determination.

ii. Evaluation of selected legumes as a supplementary feed resource for livestock

Adoption of adapted and productive herbaceous legumes in semi-arid eastern Kenya is limited mainly by lack of information on their utilization. Although there has been effort to investigate how some of these legumes can be integrated with crops, little has been done to assess their benefit as livestock feeds. The aim of this study is to determine the chemical composition of some of these legumes and monitor the growth of livestock when fed with these legumes. The KDPG are used for the study at NDFRC, Katumani. A feeding trial on two herbaceous legumes,

Table 5. Legume seed in store by 30th June 1999

Species	Amount (kg)
Mucuna Pruriens	132
Canavalia ensiformis	78
Crotalaria juncea	10
Centrosema pubescens	5
Lablab purpureus	6.5
Dolichos biflorus	7.9
Neonotonia wightii	21
Vigna villosa	6.0
Vigna unguiculata (K80)	8.5
Phaseolus lunatus	13.5

Table 6: Members of Network Project and Research Site

Network member	Institution	Site	Activity
H.M. Saha	KARI	Mtwapa	Integrated nutrient management
B.M. Muli	KARI	Mtwapa	Cowpea trial
R.W. Muinga (Ms)	KARI	Mtwapa	Livestock feeding (LF) studies
J.G. Mureithi	KARI/RF	Gatanga	Legume residual management(LRM) studies
J. Gitari	KARI	Embu	INM studies
D.M.G. Njarui	KARI	Katumani	LF studies
C.C.K. Gachene	UoN	Kabete/Machakos FTC	LRM studies
B. Kirungu (Ms)	EAT	Kitale	LRM studies
J. Ojiem	KARI	Kakamega	INM studiest
S.N. Maobe	KARI	Kisii	LRM studies
N. Kidula	KARI	Kisii	LRM studies
P. Tana	KARI	Kendu Bay	LRM studies
O. Okoko	KARI	Kendu Bay	Pigeon pea variety trial
A. Oduwo	C-MAD	Lower Nyanza	Striga control with legume GM

siratro and glycine has been completed recently and the findings are being compiled. Two more legumes; lablab and velvet bean are being bulked for another feeding study. Rumen degradability of DM and N using fistulated animal will be carried out at RRC, Mtwapa.

f) Legume seed bulking

A major activity of each Network member is to multiply seed for the legume that are promising in their site for further research and for distribution to the participating farmers. The extra seed produced are forwarded to the Network Coordinator at NARL for storage. The storage at NARL will soon be converted to a cold store for long life storage of seed. For seed requirements, contact the Network Coordinator. Seed will be supplied at nominal fee to cover cost of production. The network has several legumes under seed production but only legumes with 5 kg of seed and above are shown (Table 5).

FARMERS VIEW: GREEN MANURE LEGUMES SHOW POTENTIAL IN GATANGA

Green manure legumes were introduced to farmers in Gatanga, Thika District to address decline in soil fertility. Mr Simon Mwaura and his wife were among the first participating farmers. Of the legumes that were introduced, they were particularly impressed by the performance of velvet bean and sunnhemp. This is because they were quick to establish and produced high biomass. Mr Mwaura observed that because of the faster establishment, the legumes covered the ground quickly, reduced soil erosion and suppressed weed growth. Since they started using the legumes, Mr. Mwaura is happy to report that maize yield has increased three folds from 1.3 to 4.5 t ha^{-1}. Nowadays Mwaura and his wife strongly believe that the green manure legumes restored life to soils as their soil is now "alive"!.

Although they were not impressed by canavalia as a green manure legume, they are now growing it for controlling moles. Previously moles were causing serious damage to sweet potatoes, maize at tasselling stage and banana stems. Nowadays there are no moles and crops are thriving well. Because of the successes that they have had with legumes, many neighboring farmers and others from afar, visit them to learn the benefits of the legumes. Mwaura and his wife have thus become trainers on the value of green manure legumes and how to establish them. Another important task they undertake is of seed bulking. Mr Mwaura says that they decided to bulk seed because of the serious problem they had in acquiring seed when they wanted to expand their plot. He notes that because the legumes are incorporated at the vegetative stage there is hardly any opportunity to harvest seed. They therefore decided to set land aside for bulking velvet bean, Jack bean and sunnhemp seeds for their own use and for sharing with other farmers.

END OF YEAR NETWORK MEETING

The end of year meeting was held at RRC, Kisii from 10-11th December 1998. The purpose of the meeting was to review the progress made during the year 1998 and plan the way forward. Ten members attended the meeting that was officially opened by the Centre Director, Mrs F. Makini. She commended the use of legumes as one method to improve the soil fertility and as a source of livestock feed. The Director also appreciated the research agenda of the meeting and the Network's role in the region. Brief technical progress reports were presented by each member who attended the meeting. On the second day, there was a field visit to see some of the Network activities in South Nyanza.

OTHER IMPORTANT NETWORK ACTIVITIES UNDERTAKEN IN 1998

- Twenty farmers from Gatanga visited the Network activities in Embu on 25/6/98. The visit was hosted by Centre Director, KARI, Embu and Mr. Gitari. The purpose of the visit was for the farmers to familiarize with the Network activities and interact with farmers involved in the research activities at on-farm sites in Embu.

- A farmers' field day was held at Jembe Farmers' Group farm on 19/8/1998. The major activity of the group is mainly maize and vegetable production. The field day was facilitated by Mr. Saha and Mr. Muli and was attended by 40 farmers. One of the main topic covered was use of organic and inorganic fertilizer as a means of restoring soil fertility.

- A one day workshop was held in Sept 1998 in Kimutwa, Machakos to sensitize farmers on the need of using GMCC for soil fertility improvement. This was conducted by Dr. Gachene and Dr. Mureithi and organized by Mr. Njarui. After the workshop, 21 farmers were selected for on-farm trial work with GMCC.

- Farmers' seminar on soil fertility and crop growth was conducted on 27/9/98 at Embu Farmers Training Centre. Twenty three farmers currently participating in implementing Network trials at the Embu site and two extension officers from the Ministry of Agriculture attended. Shem Kanyanjua of KARI-NARL was the main facilitator assisted by Mr. Gitari.

- Tabitha Kamande of Baraka Agricultural College was attached to Network activities in Gatanga for four months from September to December 1998.

- University of Nairobi is conducting on-farm soil erosion control study using green manure legumes in collaboration with Gatanga site on-farm research team.

- The Network members participated in an exercise of documenting GMCC Systems practiced or being introduced in different parts of Kenya. This was part of an exercise coordinated by CIDDICO (International Centre for Information on cover crops) on behalf of RF Mexico programme to take inventory of GMCC systems. About 17 cases were documented which included systems for crop and livestock production. The documentation included description of system and the agroecological zones where it is found, summary of key aspect of the systems, performance of the main crops and the associated legumes, diffusion strategy and adoption rates

The research work visited included the residual management study of S.N. Maobe at the research centre, research activities of C-MAD in Bogetario and Ndhiwa and O. Okoko's pigeon pea variety adaptation trial in Nyakach. It was noted during the meeting that members had expanded their seed bulking plots and were requested to forward seed for storage at NARL. Members were also requested to submit their research protocols for the year 1999 as well as financial returns for 1998. The idea of starting this newsletter for the network was mooted in this meeting.

ABOUT THE SOIL SCIENCE SOCIETY OF EAST AFRICA (SSSEA)

Introduction

The SSSEA was formed in 1975 and its primary objective is to promote the study, research and teaching of soil science and related subjects and application of recent research findings in soil management and conservation in East Africa. The Society is involved in several activities and the main ones include:

- holding annual meetings during which members can present professional papers and discuss matters of professional interest.
- compilation of summaries or bibliographies of soil science research carried out in, or relevant to, East Africa.
- promotion of proper conservation, development and utilization of East African soil and other natural resources.

Membership categories

The membership to the society is open to the following categories;

a) Ordinary membership. This membership is open to those engaged in research, teaching, or any other related activity involving soil and other natural resources.

b) Student membership. Membership is open to students who are currently enrolled in institutions of higher learning upon nomination by an ordinary member. Student members shall have no right to vote and shall not hold any office or be elected to any position in the Society.

c) Institutional membership. Membership is open to those institutions that prescribe to the objectives of the society.

Membership fees

For ordinary and student members the fee is the equivalent of US$ 5.00 and US$ 2.00, respectively and thereafter an annual subscription fee of a similar amount. No fee has been set for institutional membership but a fee of US$ 500 is being recommended.

Annual Conference and Silver Jubilee

The 1999 annual conference will be held in Kampala from 6th to 10th September. It coincides with the Society's Silver Jubilee Celebrations. We hope you received the first announcement for submission of abstracts in good time. It was inviting papers in the following fields; soils surveys, soil information management and use, land use planning, policy issues and land management, management of natural resources and environmental change, use of organic and inorganic resources for sustaining soil productivity, soil technology development, transfer and utilization, soil and water management, tillage and its effect on soil and on crop performance, agroforestry, gender issues in soil management, indigenous knowledge on soil management, livestock in soil management, biodiversity and sustainable land management and socio-economic issues in resource management.

Kenyan officials of SSSEA

Vice Chairman	**Treasurer**	**Executive committee members**	
Joseph G. Mureithi	P.N. Macharia	P.F. Okoth	S.K. Kimani
Forage Agronomist	Soil Scientist	Soil Scientist	Agronomist
KARI-NARL	KARI-NARL	Kenya Soil Survey	KARI-Muguga
P.O. Box 14733	P.O. Box 14733	P.O. Box 14733	P.O. Box 3014
Nairobi	Nairobi	Nairobi	Nairobi
Tel. 440935	Tel. 440903	Tel. 440903	Tel. 0154-32880-6

Membership and subscription

For information about membership and subscription please contact the Treasurer.

NETWORK PUBLICATIONS

Maobe, S.N., Dyck, E. and Ondicho A., 1997. Legume screening for soil fertility improvement in a high potential area in south west Kenya. *Paper presented at the Soil Management Project Conference held at Kanamai, Momabsa, 23rd – 28th March 1997.*

Maobe, S.N., Mbugua, D., Makworo, Ondicho A. and Dyck, E. 1997. Researching with farmers on green manure technology in a high potential area in south west Kenya. *Paper presented at the Soil Management Project Conference held at Kanamai, Momabsa, 23rd – 28th March 1997.*

Tana, P.O., Ngoti, B. and Dyck, E., 1997. Legume Screening trial at Kendu Bay south west Kenya. *Paper presented at the Soil Management Project Conference held at Kanamai, Momabsa, 23rd – 28th March 1997.*

Wandera, J.L., Muyekho, F.N., Mbugua, D.M., Kiruiro, E.M., 1997. Effects of intercropping herbaceous legumes and napier on dry matter production in the high rainfall highlands of Kenya. *Paper presented at the Soil Management Project Conference held at Kanamai, Momabsa, 23rd – 28th March 1997.*

Gitari, J.N., Dyck, E. and Maina, P., 1997. Legume screening for potential soil fertility improvement in medium altitude areas of mt. Kenya region. *Paper presented at the Soil Management Project Conference held at Kanamai, Momabsa, 23rd – 28th March 1997.*

Gachene C.K.K., Makau M., 1997. Screening legume cover crops for dry-season survival in semi-arid environment of Kenya. *Paper presented at the Soil Management Project Conference held at Kanamai, Momabsa, 23rd – 28th March 1997.*

Gachene C.K.K., Odour A., Klingspor and Haru R., 1997. Effect of legume cover crops on soil loss and runoff in central Kenya highlands. *Paper presented at the Soil Management Project Conference held at Kanamai, Momabsa, 23rd – 28th March 1997.*

Gachene C.K.K., Makau M. and Haru R., 1997. Soil moisture extraction by different legume crops. *Paper presented at the Soil Management Project Conference held at Kanamai, Momabsa, 23rd – 28th March 1997*

Njunie, M.N., Ali Ramadhan, Mureithi, J.G., 1997. Intercropping of forage legumes with maize and Napier (*Pennisetum purpureum*) for smallholder farmers in coastal Kenya. *Paper presented at the Soil Management Project Conference held at Kanamai, Momabsa, 23rd – 28th March 1997.*

Saha, H.M., Njunie, M.N., and Tsanje, N.M., 1997. Legume Screening for soil fertility improvement in the coastal lowlands of Kenya. . *Paper presented at the Soil Management Project Conference held at Kanamai, Momabsa, 23rd – 28th March 1997.*

Dyck, E., 1997. Screening legumes for potential for soil productivity improvement in Kenya. *Poster presented at Green Manure Cover Crops conference in Santa Catarrina, Brazil* April 6 to 12, 1997.

Gachene C.K.K. and Haru R., 1997 Controlling soil loss using purple vetch (*Vicia benghalensis*), *African Crop Science Journal Vol. 3 pp. 369-373.*

Maobe S.N., Dyck E., and Mureithi J.G., 1997. Screening of soil improving herbaceous legumes for inclusion into smallholder farming systems in Kenya. Proceedings of the Soil Fert Net Results and Planning workshop held from 7 to 11 July 1997 at Africa University, Mutare, Zimbabwe. Soil Fert Net and CIMMYT-Zimbabwe, Harare, Zimbabwe. pp 105-111.

Mureithi J.G., Gachene C.K.K., Saha H.M. and Dyck E., 1998. Incorporation of green manure legumes into smallholder farming systems in Kenya: achievements and current activities of Legume Screening Network. *Paper presented in an international workshop on Agrobiological anagement of soils and cropping systems in Madagascar, 23 - 28 March 1998*

Gachene C.K.K., 1998. Moisture extraction in a mucuna-maize based cropping system. *Paper presented at the 16th Conference of Soil Science Society of East Africa held at Tanga; 13-19 December 1998.*

Mureithi J.G., Dyck E., Gachene C.K.K., Gitari N., Kirungu B., Maobe S.N., Muli M.B., Njarui D.M., Okoko.O., Ojiem J. and Saha H.M., 1998. An over-view of Legume Screening (research) Network Project: Achievements, current activities and future direction. *Paper presented at the 16th Conference of Soil Science Society of East Africa held at Tanga; 13-19 December 1998.*

Mureithi J.G., Maobe S.N., Dyck E., Gachene C.K.K., Gitari N., Kirungu B., Muli B.M., Ojiem J., Saha H.M. and Tana P., 1998. Screening of legume germplasm in Kenya: Effect of rhizobia inoculation on performance of best bet legumes. *Paper presented at the 16th Conference of Soil Science Society of East Africa held at Tanga; 13-19 December 1998.*

ANNOUNCEMENTS

Fourth International Crop Science Conference for Africa, Casablanca, Morocco, 11-14 October 1999. Information : Dr. Ismaili Mahammed, Conference Chairman, Faculte de sciences, B.P. 4010; Fax: 212 5536808; Email:ismaili@aim.net.ma.

The 17th annual general meeting of Soil Science Society of East Africa (SSSEA) will be held in Kampala from 6-10th September 1999. For more information contact the office bearers shown above.

National Land and Water Management Conference. It will be held at KARI Headquarters from 15th to 18th September 1999. For more information please contact Dr. R.M. Kiome (AD, SW), P.O. Box 57811 Nairobi, Tel 583301-20, e-mail Kiome@kari.org

The Second Soil Management Project Conference will be held in the first quarter of year 2000. Specific details and venue will appear in the next issue of the Network newsletter.

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