Report on 3-8th July visit. Support and follow-up of trained field staff by Dr Jackson Njuguna, Dr Peter Dorward and Dr David Miano Mwangi

1 Introduction

The objectives of visiting extension and NGO staff and farmers were to:

1. Provide support to field staff
2. Monitor dissemination activities
3. Identify issues and activities that require following up and further support

Staff and farmers were visited in Limuru, Lari, Mathioya, Maragua, Kamweti, Langai and Molo. Dr Miano joined the visits to Lari, Mathioya and Maragua. Summaries of each visit are given below.

Agroecological zones (AEZ) are based on Jaethold & Schmidt, 1983

2 Findings from visits

2.1 Kiambu, Limuru division, Gitogothi area (Monday 4th July, 2005)

Altitude: approx 2200 masl
Agroecological zone: Upper Highland 2

Staff: Mary Kinuthia (deputising for Susan Moywaywa) and Peter Kiiru.

2.1.1 Farmer: Mr James Gicheha, 4 acre farm growing maize and vegetable crops. Owns one cow.

Farming system and problems faced in the area: Cool due to altitude. Farms mainly approximately 1 acre although some up to 4 acres. Average of 2 cows per farm. All dairy farmers suffer from forage shortages. Stem borer and MSVD are not problems.

Farmers Group: 20 farmers in the group. Group concentrates on agricultural activities identified by the group ie demand driven and has had regular input from extension and a budget of its own in the last year as it is in a NAREP 'focal area'.

Activities conducted: Nine farmers visited the push-pull plot at Githunguri and were very enthusiastic about the system. Area for push-pull plot to be established has been identified on this farm and Napier had been planted around the perimeter of where the maize is to be planted. Desmodium to be established in it when there is sufficient available. Two Desmodium nurseries had been established from seed and were doing well. One is ready for taking cuttings. Vines planted to bulk up have done less well with patchy survival. Desmodium will be used for this farm and to supply other group members. Large plot to bulk up Napier has been established. MSVD resistant varieties (8) supplied by FIPS have been distributed to members of group including Pan 67, KH521 and several from western seeds – WS505, WS 403, WS202. Not all are suitable for the highlands. Each farmer has several but not a full set

making comparison difficult. All the varieties tried on this farm had performed extremely poorly.

Issues and questions identified:
Some farmers outside the group are interested in growing Napier and Desmodium together.
Mr Gicheha observed in two plots that maize adjacent to the Napier was shorter and felt there may be an 'edge effect'.

Sustainability of dissemination:
Was one of three 'focal' areas for the year (June 04-05) under NAREP. Senior staff assist with work and focus on 'focal' areas for one year and transport etc is funded. In the following year there is some continued support funded. Following this local extension staff continue to work with farmers groups as part of their normal activities and will do so regarding push-pull etc with this group.

Follow-up actions required:
Information and advice on cutting and feeding Desmodium.

2.2 Kiambu, Limuru division, Tharuni area (Monday 4th July, 2005)

Altitude: approx 2000 masl
Agroecological zone: Lower Highland 2

Staff: Mary Kinuthia (deputising for Susan Moywaywa) and Peter Kiiru.

2.2.1 Farmer: Mr James Mbuthia. 6 acre farm and has 5 cows. Grows much forage (Napier and Rhodes grass) as well as maize and vegetables. Chairman of the local farmers group.

Farming system and problems faced in the area: Farms on average approximately one acre with 2 cows per farm. All dairy farmers suffer from forage shortages. MSVD is very serious this season at this lower altitude. Stem borers are a problem in Tharuni area.

Farmers Group: 30 farmers in the group. Farmer run and are very active and often 70 attend training. Set up interest groups and do training on range of issues which any farmers can attend (encouraged to) including Eucalyptus, avocados, dairy goats, silk worms, energy efficient stoves, soap making, yoghurt, fruit juice, savings clubs. Tharuni is the only NAREP 'focal area' in Limuru division in 2004/5.

Activities conducted: Push-pull plot has been established with Napier around outside. Desmodium still to be planted when sufficient is available from the group nursery. MSVD tolerant cvs have been tried. These generally show some signs of infection but less than other varieties. Ways in which the cvs will be compared were discussed. The chairman intends to ask farmers what they wish to make comparison on and will ensure that infection, cob size,

yield and stover are included. Lines or a set number of plants from each cv will be used. Cvs from Western seeds looked best at present and better than Muguga 1.

Issues and questions identified:
Farmers were disappointed that the resistant cvs showed signs of infection. Perhaps this needs to be clarified when introducing the cvs ie infection is reduced not prevented.
How to assess varieties was discussed.
Muguga 1 is available in local shops but not Pana.

Sustainability of dissemination:
Extension staff will continue to work with this successful and active group which uses its extension staff well and with whom they clearly have good relations.

Follow-up actions required:
Information and advice on cutting and feeding Desmodium and Napier.
Information on silage making with Desmodium and Napier.

2.2.2 Farmer: Mrs Njiriri. Next door farm to the above farmer and of similar size. Member of same group and so much of the information is the same as for 2.2.1. Owns 5 cows which were in good condition. Also keeps broilers.

Farming system and problems faced in the area: As above.

Farmers Group: As above.

Activities conducted: Is growing resistant varieties (not seen close up) and has made two amounts of Napier silage in above ground clamps (approx. 2m*2m each) and one bag (for a group demonstration). All was cut by hand powered cutter.

Issues and questions identified:
Need to discuss feeding of silage.

Sustainability of dissemination: As above.

Follow-up actions required:
Discuss evaluation of cultivars.
Information on feeding silage.
Information and advice on cutting and feeding Desmodium and Napier.
Information on silage making with Desmodium and Napier.

2.2.3 Farmer: Mrs Felister Kimunya.
Farm similar to above but with wide variety of vegetables grown.

Farming system and problems faced in the area: As above.

Farmers Group: As above.

Activities conducted: Bulking up Kakamega 1 Napier. Has three beds of Desmodium (established from seed) that are in reasonably good condition. Each bed is approximately 1m * 3m. Vines have also been planted in interows in a maize plot to propagate more. These were planted in lengths of approx. 1.5 feet (i.e. lengths supplied were not cut) and have taken well. Resistant maize cultivars were doing reasonably well.

Sustainability of dissemination: As above.

Follow-up actions required:
Information and advice on cutting and transplanting Desmodium and Napier.
Information on evaluating cvs.
Requested more Desmodium seeds.

2.3 Kiambu, Lari division, Soko Mjinga area (Monday 4th July, 2005)

Altitude: approx 2590 masl
Agroecological zone: Lower Highland 1

Staff: Richard Tompo

2.3.1 Farmer: Mr Ng'ang'a. 6 acre farm and has 5 cows. Grows maize, much kale and cabbage and keeps dairy cows, sheep and rabbits.

Farming system and problems faced in the area: High altitude and therefore cool. Neither MSVD nor stem borers are a problem, but shortage of forage is a problem in the area. The average number of cows per farm is two.

Farmers Group: Initially started to test and multiply vegetable seed 2 years ago but now cover other agricultural issues.

Activities conducted: Seed provided to this and another farmer in group after farmers in the group saw the push-pull at Githunguri and liked it. On this farm first sowing was frosted soon after germinating. Some seed had not germinated and did so later and has established well. One bag of vines was also provided and shared with four other farmers. On this farm they had established very well due to most soil and again were planted in 1.5 foot lengths. From now on will start giving to other farmers. Has been feeding Desmodium to cattle and sheep who like it. Has also obtained Desmodium from another farmer who was already growing it after introduction with Napier several years ago. MSVD resistant varieties also planted (Western seed 202, 403 and 505, Muguga 1 and Pan 67). These all looked very poor like those at Gitogothi eg less than 1.5 feet, where it is also cool and high. Local cv was doing well. Kakamega 1 Napier canes were sprouting and the farmer wants to establish a push-pull site.

Issues and questions identified:

Is frost only an issue at germination? Farmers decided in future to position seedbeds away from the valley to reduce frost. Presence of Desmodium in the area already may suggest that frost is not a problem.
The farmer is convinced that where he had planted Desmodium vines between his vegetables (kale and cabbages) pests were reduced ie Diamond Backed moth and cut worm. He had not had to apply chemical sprays which he would normally. However the vines were small and it seems unlikely that they would have such a large effect at this stage. The farmer was keen to experiment and ways of doing so ie comparing two plots with and without vines but grown in same way and on same soils, was discussed. He also noted that rats had been a pest in the nursery and eat Desmodium.

Sustainability of dissemination: Richard will continue to work with the group.

Follow-up actions required:
Information and advice on cutting and feeding Desmodium and Napier.
Information on silage making with Desmodium and Napier.
Seed requested for more farmers.
Note whether frost is a problem for established Desmodium.

2.4 Murang'a District, Mathioya area (Tuesday 5th July, 2005)

Altitude: approx 1800 masl
Agroecological zone: Upper Midland 1

Staff: Francis Kiriri

2.4.1 Farmer: Mrs Daniel Maina Kamau, 0.7 acre farm growing maize and some vegetable crops. Owns one cow. Very steep sloping land.

Farming system and problems faced in the area. Farms mainly approximately 0.25 to 1 acre and own one cow. All dairy farmers suffer from forage shortages. Land is very steep hillsides that are terraced. Ownership is in strips so that farmers have access to same types of land. Stem borer is a problem and MSVD can be but not this year.

Farmers Group: Mathioya self help group has 20 farmers all of whom are young parent age. Group aims to help members and to look after orphans and widows. The group has a savings fund i.e. a 'merry go round'. Also very active in tree planting and runs a nursery (emphasis on planting indigenous trees i.e. *Prunus Africanus*) and has planted approximately 600,000 seedlings here and in forested areas. Note that this is in the area influenced by the highly successful 'Greenbelt' movement. Activities identified by the group i.e. demand driven and has had regular input from extension and is in a NAREP 'focal area' and therefore received support from this in the last year.

Activities conducted: Nineteen farmers visited the push-pull plot at Githunguri. Four have set up push-pull plots on their farms. Most farmers were provided some varieties of improved maize to try. The push-pull plot on

the farm visited looked healthy and Desmodium was establishing well. A small nursery has been established too but will need more seed / vines. Due to poor survival initially, the farmer used some silver leaf Desmodium which grows in hedges locally and must have been introduced several years ago. Farmers were unaware of its value as forage. Maize varieties tried on this farm were Pan 67, WS202, WS403, WS505 and KH521. The farmer normally grows 614 and 513. Most varieties looked in good condition. Pan 67 followed by WS403 were the best looking and were tall, healthy and had good looking cobs.

Issues and questions identified:
How the varieties will be compared was discussed. Farmers mentioned earliness, no. of cobs, how full cobs are, yield. They obviously need to include forage.
The group requested more Desmodium seed.

Sustainability of dissemination:
Was one of three 'focal' areas for the year (June 04-05) under NAREP. Following this, local extension staff continue to work with farmers groups as part of their normal activities and will do so regarding push-pull etc with this group.

Follow-up actions required:
Information and advice on cutting, feeding and conserving Desmodium.
Seed of maize varieties for next season needs to be made available if field days are held for farmers to evaluate the MSVD resistant varieties.
Desmodium seed.
Information on evaluation of varieties.

2.5 Kenya Institute for Organic Farmers (KIOF), near Muranga (Tuesday 5th July, 2005)

Altitude: approx 1400 masl at Small Earth to 1200 masl at Maragua Ridge
Agroecological zone: Lower Midland 4

Staff: Lucy Wangui

2.5.1 Small Earth Farm, KIOF

Activities
On this experimental and demonstration farm of KIOF's two nurseries of Desmodiium had been successfully established. A plot to bulk up Kakamega 1 had also been successfully established. Some Desmodium seed had been given to farmers by KIOF too.

2.5.2 Farmer: Mr Njombai (Maragua Ridge).

Has a 10 acre farm growing maize and a wide variety of vegetables. Relatively flat relief. Lack of water is a major constraint in the dry periods each year.

Farming system and problems faced in the area: A dry area at certain times of the year. Land shortage is not such a constraint as other areas visited and farms are larger. Livestock are grazed and given supplementary feed in the dry season where possible. The average farm size is 6 acres with 2 milking cows. Lack of forage and stem borer are major constraints.

Farmers Group: The organic farmers group was started in 1998 and has approximately 30 active members.

Activities conducted: A push-pull plot of 45 m * 45 m had successfully been established. Desmodium was planted every third interrow and had established well. Also growing Kakamega 1 Napier. The following varieties of maize were tried WH 405, WH 403, Pan 67, WS 202, Muguga 1. Muguga 1 looked the best very clearly. Normally grows Duma, a Malawian variety. All varieties had been planted a bit late (early April) due to supply problems. The group also has a Desmodium nursery (not seen**).**

Issues and questions identified:
Harvesting and comparing varieties was discussed and the importance of including forage in assessment noted.
In this dry environment farmers make hay with bean stems. The same could be done with Desmodium.
Feeding (fresh) Desmodium was discussed i.e. in proportions of one third (max) of Desmodium, with two thirds Napier.

Sustainability of dissemination:
KIOF will continue to work with this group.

Follow-up actions required:
Information and advice on cutting and feeding Desmodium.

2.6 Kirinyaga Farmers Training Centre, Kamweti (Wednesday 6th July, 2005)

Altitude: approx 2200 masl
Agroecological zone: Lower Highland 1

Staff: Ephantus Mwangi, principal of the FTC.

2.6.1 The FTC farm. A very active and professionally run FTC that had many experiments and demonstrations for farmers. Recent field day had had 212 farms (156 women) and 14 collaborators from the private and public sectors e.g. tea officers, agrochemical suppliers.

Farming system and problems faced in the area: The FTC serves the farms in the area and these are in tea and coffee zones. Farms are at a wide range of altitudes given the relief. Farmers in the area grow tea, coffee, maize and some vegetables. Two thirds of farmers have cows (1-3 cows) and there are various dairy groups in the area. Forage shortage is a major problem between January

and April. MSVD, stalk borer and head smut are problems in the area but vary with location and altitude. Land is a major constraint and farms are small and the area on which forage can be cultivated is limited.

Activities conducted: Included in the field days mentioned already were demonstrations on tube silage making and showing farmers the Desmodium nursery and how to do cuttings. One of the dairy groups is keen to get Desmodium material and Kakamega 1. Desmodium nurseries have been established and look very healthy. Kakamega 1 is being bulked up on 0.75 acres and farmers have said that they are willing to pay for stems (2 bob each). It is intended to establish a push-pull site. Desmodium vines are being grown for cutting and have also been planted under avocado trees. Little else grows here and as Desmodium is shade tolerant could provide a means of utilizing this area. MSVD resistant varieties are being grown i.e. Pan 67, 516, Muguga 1, 614. Interestingly there were quite a few deformities in the 516 (i.e. tassle with cob together) but also in some other varieties. Pan 67 appeared to have a bacterial disease.

Issues and questions identified:
Comparison of maize cultivars was discussed. Feeding of Desmodium and Napier and storage also discussed. Agreed that it may be good to invite Land O'Lakes to do a demonstration of small bag silage at the next field day. Contact needed for this.

Sustainability of dissemination:
FTC will continue to work on these issues.

Follow-up actions required:
Information and advice on cutting and feeding Desmodium and feeding silage. Contact in Land O'Lakes.

2.7 Nakuru district, Longai division, Menengai (Thursday 7 July 2005)

Altitude: approx 1940 masl
Agroecological zone: Lower Highland 3

Staff: Francis Mbiru Mwangi and Daniel Njoroge, FIPS - Africa

2.7.1 Farmer: Mr Sammy Gitau. Four acre farm. Owns 2 milking cows and has zero-grazed in last two years.

Farming system and problems faced in the area: Average 2 acres and keep 2-3 cows. Also milking goats. Most do not zero-graze generally / new addition. Grow maize, often intercropped with beans, vegetables for cash eg cabbages, tomatoes. Stem borers are a severe problem. Forage shortages are severe in February to April. MSVD was not a serious problem in long rains 2005 but in the past, it has been. In contrast to Kiambu, farmers do not thin maize for forage (almost taboo).

Farmers Group: Member of dairying interest Farmer Field School (FFS). 20-30 members. Formed two years ago.

Activities conducted:
1. Push-pull. Farmers had not had the opportunity to see a push-pull plot. Established push-pull plot of 45M by 40M. Three rows of Napier around perimeter. Desmodium planted every third interrow and beans in others. Push-pull established slightly late and Desmodium establishment from vines is satisfactory. Expect will take off in next season and plan to gap up in long rains as survival more likely (short rains unpredictable and temperatures high) and will have sufficient vines by then. Maize variety WH403 from Western Seeds. Napier reasonably established was smut resistant Kakamega 1.
2. Seedbed of Desmodium to supply self and other group members established. Reasonable establishment. With continued watering should provide a good source but is not ready yet.

Issues and questions identified:
1. Use of surplus forage – opportunity to make hay (farmers familiar with hay) and for tube silage. Land O Lakes based nearby.
2. Cutting and feeding of Desmodium
3. This demonstration was established with use of herbicides (applied before maize germination and beans have been planted). This is a new practice FIPS are promoting. FIPS wish to explore whether there is a herbicide that will not affect Desmodium. If not could try spraying with a hood on small area. If not will revert to weeding by hand.
4. Used a low cost root stimulant on Desmodium and consider that this increased rooting and establishment.

Sustainability of dissemination: FFS group will continue as is active. FIPS will continue to visit and work with farmers. Another 5 FFSs are in the immediate area with a total of approximately 200-250 farmer members. All FFSs will visit the demonstration push-pull once it is fully established. At a field day members from a further 14 groups (3,500 farmers!) will view the site.

Follow-up actions required:
Leaflet on cutting, feeding and conserving Desmodium and Napier needed.
Advice on herbicides requested ie see above.
Invite Land O Lakes to demonstrate silage making when producing excesss fodder.

2.8 Nakuru district, Molo division, Sachangwan area (Thursday 7th July, 2005)

Altitude: approx 2500 masl
Agroecological zone: Lower Highland 2

Staff: Francis Mbiru Mwangi and Daniel Njoroge, FIPS - Africa

2.8.1 **Farmer:** Mr Nganga Mwangi. Four acre farm. Owns 1 milking cow which is zero-grazed here and has other cattle grazed in the forest area.

Farming system and problems faced in the area: High potential area with better rainfall than the previous location visited. Warm temperatures. Average 4-5 acres and keep 2-3 cows. Of 27 farmers in the group 15 have dairy cows. All graze them in the forest area and do not zero graze. Forage shortage is a major problem in January to March. Grow maize, often intercropped with beans. Also grow vegetables for cash eg cabbages, tomatoes**.** Stem borers are a severe problem. MSVD is not a problem. Farmers do not thin maize for forage but plant 3 per hole.

Farmers Group: Member of farmer group which was established by farmers for self help 2 years ago. Now involves an MOA extension worker. Meet monthly for activities on each others farms. Try and implement activities that will improve farming incomes. Have a 'merry go round' i.e. revolving fund to which each member contributes 100 KS per month. This then given to a member for farm improvements when saved enough and on a rotational basis.

Activities conducted:
1. Push-pull. Farmers had not had the opportunity to see a push-pull plot. Established push-pull plot of 50 m by 50 m. Three rows of Napier around perimeter. Desmodium planted every third interow. Desmodium establishment from vines is good but will require some gapping up. This can be done in the short rains as they are normally good. Maize variety WH403 from Western Seeds. Napier reasonably well established except along one side which will need gapping up. Kakamega 1 used.
2. Seedbed of Desmodium to supply self and other group members has been established. With continued watering should provide a good source but is not ready yet.
3. Established stand of Kakamega 1 for multiplying up.

Issues and questions identified:
1. Use of surplus forage – opportunity to make hay (farmers familiar with hay) and for tube silage.
2. Cutting and feeding of Desmodium
3. This demonstration was established using one seed per hole and in lines as FIPS encourage this. However it will be pointed out to farmers that the push-pull can incorporate normal farmer maize planting (three seeds per hole).

Sustainability of dissemination: FIPS will continue to visit and work with farmers. Representatives from 26 farmers groups will also attend a field day when push-pull more mature.

Follow-up actions required:
Information on cutting, feeding and conserving Desmodium and Napier needed.
Invite Land O Lakes to demonstrate silage making when producing excess fodder.

Other notes re the above two locations:

1. A third push-pull site has been established at Bahati. Here farms are smaller 1-1.5 acres. Members of 10 groups (approx 200 farmers) will attend a field day to look at push-pull when fully running.

3 Brief observations on dissemination activities

In general dissemination activities are progressing very well. Extension and NGO staff visited had successfully identified and worked with existing farmers groups who were trying out practices. Reasons for dissemination working well include the excellent support being offered by research to extension and that from the 'basket of technologies' there is one or more of relevance to each of the groups despite differences in climate and systems. The extent to which dissemination activities have been successful and lessons from this should be explored at the end of the project later this year.

4 Follow up activities required

Despite the different agroecological zones and farming systems visited some common areas requiring further information or support were apparent. These generally refer to issues/activities that the groups are about to experience for the first time e.g. harvesting Desmodium. Extension and NGO staff require support in the following areas. Current advice and sources of information are summarised under each.

4.1 Harvesting of Desmodium i.e. timing, height etc

During the growing season ensure that it does not compete with the main crop eg maize. To do this, train the Desmodium to grow down interrows or trim it if necessary. Cut Desmodium at the end of the growing season to a height of 2-3 inches above the soil or perhaps cut a little later and in stages if farmers want for dry season feed. Manage cutting so that there is sufficient Desmodium present at the start of the next rains for it to grow again. Ploughing/cultivation is not possible on the Desmodium rows.

4.2 Making silage with Napier and Desmodium

As outlined in the training course. Ensure that the mix of chopped fresh material is no more than one third Desmodium. Probably best to aim for one quarter Desmodium by volume. This is because a) Desmodium is higher quality feed and is best used like this and b) too much Desmodium stops the ensiling process working well.

4.3 Making 'hay' with Desmodium

In dry areas where farmers are familiar with making hay with bean stalks and plants, it should be possible to do the same process except using Desmodium.

4.4 Feeding 'fresh' Desmodium

Desmodium is a high quality forage and should not be wasted by feeding it on its own. It therefore needs to be mixed with other lower quality forages the farmer normally feeds such as Napier and Rhodes grass or maize thinnings. Desmodium should make up no more than one third of the volume of forage fed.

4.5 Feeding silage

Livestock may take a while to get used to the taste of silage and may refuse it at first. Give them some and just wait until they start eating it. Once used to it they eat it very readily. It is very important to stop air getting to the silage once you have opened the bag as it will spoil the top layer of silage. Therefore scoop out only the amount you intend to feed and recover the hole made with plastic and weigh it down e.g. with a stone. If you are feeding animals with silage only then 14-20 kg per cow per day is recommended.

4.6 Farmers evaluating maize varieties

Evaluation will best be done when the group meets and the extension facilitator is present. Farmers should decide on what characteristics they wish to use to evaluate the varieties e.g. cob size, grain yield, date to maturity. Please ensure that farmers include forage and total grain yield. Remember to include the main variety that the farmers normally grow so that they can compare the new varieties with it. If a new variety has failed badly then there is probably no point in comparing all the characteristics – please just note which varieties they are. Farmers need to decide how much to compare e.g. how many plants. We suggest a minimum of 20 of each variety if possible (and please make a note of this with farmers as they may find it useful to work out the yield per acre). In selecting the rows, or areas of the plot to evaluate, make sure that there are no obvious problems with it i.e. a poor (or very good) patch due probably to soil or drainage. It would be useful if extension staff informed Dr Njuguna immediately which varieties, if any, farmers want more seed of to try the following season / year.