Workshop on mitigating the impact of Napier grass smut and stunt diseases for the smallholder dairy sector - Sharing results: Final Report, June 1-3, 2010[1]

The Napier grass smut and stunt disease resistance project was funded by ASARECA in response to the concern of farmers and policy makers about the impact these diseases are having on the livelihoods of smallholder farmers in East Africa.

The project ended with a workshop to share knowledge, review outcomes and assess the impact of the project on small holder dairy farmers in East Africa. Entitled: *Mitigating the impact of Napier grass smut and stunt diseases for the smallholder dairy sector: Sharing results,* the workshop was held at the International Livestock Research Institute (ILRI) campus, in Addis Ababa, Ethiopia from June 1-3, 2010.

The workshop aims were:

- To sensitize scientists in the region on the problem
- To share information on progress to mitigate the disease with projects' partners and extended partners
- To involve scientists for scaling up projects results in the region

See Full Programme and **list of participants** in Annexes 1 and 2 at the end of document

DAY 1

An overview presentation about the project was made by *Janice Proud*, Coordinator of the ASARECA Napier grass disease resistance project, ILRI, following opening remarks by *Sarah Mubiru*, ASARECA Representative, and welcome address by *Shirley Tarawali*, ILRI Theme Director, People, Livestock and the Environment,.

See the full presentation on The project Napier grass smut and stunt resistance on http://tinyurl.com/26orxha

[1] Report prepared by Genevieve Renard, September 2010

I/ First session

This session concerned the project partners' overview of the Outcome and Achievements of the project in their country including their latest work as shared with their stakeholders at their recent national workshops.

Outcomes and achievements: Partners' presentations

Margaret Mulaa, Senior Principal Research Scientist (Head of the Crop Protection Section), works for the Kenyan Agricultural Research Institute (KARI), and was project team leader in Kenya. She was responsible for activities including surveys of extent and severity of disease, collection and evaluation of germplasm, screening for disease resistance, dissemination of project results and M&E. She tried as much as possible to involve farmers in her research, following their demand for disease tolerant varieties. She had farmers setting up on farm trials and raising awareness of Napier grass diseases in their communities, in response to the recent movement of smut to western Kenya and stunt to central Kenya.

See the full pps presentation on http://tinyurl.com/2vw768g

Beatrice Pallangyo, Principal Agricultural Officer in the Ministry of Agricultural Food Security and Co-operatives in Tanzania, was project team leader in Tanzania and responsible of activities similar to the ones in Kenya (see above). She had to raise awareness about stunt and smut which are only emerging in Tanzania, in order to avoid the spread of the diseases. The monitoring system put in place was effective.

See the full pps presentation on http://tinyurl.com/26o57ag

***Jolly Kabirizi**,* Senior Research Officer at the National Livestock Resources Research Institute (NaLIRRI) in Uganda, working on Napier Stunt Disease (NSD) reduction, and project team leader in Uganda (see activities listed under Kenya) strongly believes that policy makers play a key role in controlling NSD and produced a policy brief in Uganda (Napier Stunt and Smut diseases policy brief, May 2010**,** http://tinyurl.com/22tdt5m**)**.

See the full pps presentation on http://tinyurl.com/2bxzttd, or read the paper in Annex 3 of this document.

Charles Midega, from the International Centre of Insect Physiology and Ecology (ICIPE), then presented ICIPE's work and explained the importance of analyzing the biology of the disease and its vector in Developing management strategies for Napier stunt disease. He is concerned that strategies to reduce stunt in Napier grass should not shift the vector of the phytoplasma causing stunt to important crops, such as maize, devastating production of staple crops in the region.

See the full presentation on http://tinyurl.com/27fw4ms

Questions about these presentations were held over for the 'interactive discussion' in the afternoon.

II/ Presentations about communication and Outcome Mapping

Genevieve Renard, Communication specialist, ILRI, and consultant for the Project, developed the website content and awareness material in collaboration with the project's partners. She worked on the website with ***Esther Gacheru,*** web developer and research fellow at ILRI and both presented their work in Sharing results: communication within the Napier grass disease resistance project , about tools used to build the website and how to evolve towards a Community of Practice around Napier grass. The link to the project website is: **(**https://sites.google.com/site/napiergrassdiseaseresistance/home**)**

See the full presentation on http://tinyurl.com/25x765t

Julius Nyangaga, of ILRI's Innovation Works, introduced the Outcome mapping principles (www.outcomemapping.ca) and elements to the project team and then assisted them in using outcome mapping in their monitoring and evaluation of the project. Reflecting on this, his presentation was on Outcomes mapped : how to measure the project's progress with Outcome Mapping, an M&E tool shared and used with partners

See the full presentation on http://tinyurl.com/292s69m, his report can be found as Annex V.5.A of Volume 2

III/ Interactive discussion or 'Fish Bowl'

Outcomes and impact of the project on small holder dairy farmers in East Africa?

To capture the perceived outcomes and impacts of the project in the region, an interactive discussion tool, a 'Fish Bowl', was used. This allowed the views of participants with a broad range of experience of agriculture in the region and further afield to shared and captured.

What is a 'Fish Bowl' process?

Fishbowls involve a small group of people (usually 5-8) seated in circle, having a conversation in full view of a larger group of listeners. Fishbowl processes provide a creative way to include the "public" in a small group discussion. Fishbowls are useful for ventilating "hot topics" or sharing ideas or information from a variety of perspectives. When the people in the middle are public officials or other decision-makers, this technique can help bring transparency to the decision-making process and increase trust and understanding about complex issues. Sometimes the discussion is a "closed conversation" among a specific group. More often, one or more chairs are open to "visitors" (i.e., members of the audience) who want to ask questions or make comments. Although largely self-organizing once the discussion gets underway, the fishbowl process usually has a facilitator or moderator. The fishbowl is almost always part of a larger process of dialogue and deliberation.

The process allowed a range of stakeholders to participate; a lively discussion ensued, that ranged widely, the key points raised and responses are outlined below.

1. This project was very broad but did it have any impact in any specific area?

- At the farm and community level,
    - Farmers were sensitized on management practices
    - Farmers now know the problems of Napier grass diseases, previously they did not take ownership of the problems; they do now
    - Lessons were learnt on both sides, researchers learnt from farmers too
    - Extension services are taking a lot of interest

- Results so far have had an effect
    - On farm: Awareness/recognition of diseases
    - Reduced ambiguity of cause of sick plants
    - Best management practices disseminated for disease control
- Spillover into other areas:
    - Soil fertility management/Manuring
    - Farmers are valuing Napier as commercial crop
    - Farmers now recognize alternative sources of fodder/feed
    - Raised questions of whether disease may affect other crops
    - Crop-livestock interaction/integration now being recognized by research
- Project did not have much impact on policy
    - Maybe developing a Policy brief on movement of plant materials needed

2. Or was it not broad enough?

- What about other livestock-crop issues?
- Forage used for markets?
- Inputs (fertilizers, etc.)?
- Monitoring disease devices?

3. Were more questions raised than impact made?

The project raised further questions for research, but also allowed farmers to raise questions of which Napier diseases were only one.

A. Or was the impact not sufficiently documented, for instance:

- How many farmers were reached?
    - during baseline surveys, when raising awareness
    - from feedback surveys
    - in workshops
    - in publications, media, radio

B. It is also important to elaborate criteria for impact.

C. The issue of current impacts *vs* future ones was also discussed.

D. A three year project cannot expect to have impacts at all levels, especially when responding to an emerging issue.

4. Awareness at different levels was thought to be key

To	About
• Farmers	-Diseases -Management practices -Disease control -Problem of moving plant material
• Extension	
• Policy	
• Research	

5. Impact does not come only from this project but in terms of a broader set of work

- Knowledge is generated through a network of activities, not in isolation (ICIPE, team from Denmark…), but how do you disaggregate the impact of this project rather than another?
- Was there any impact on ASARECA or other donors? Momentum and excitement raised towards solving problem

6. Other impacts

- Putting infrastructure and process in place for better understanding
- Capacity has been built, including
    - BecA
    - Developed good tools
    - Training programs
- Materials have been collected, identified
- Networks have been created
- Policy makers sensitized
- Research questions and gaps identified
- Socio-economic impacts? These were not quantified in the project
- Output > Roadmap for future actions and impacts to achieve
- Farmers shown to do regular monitoring of fields, get rid of diseased materials, till the land, use clean materials.
- Looking mostly at impact on farmers but lots of impact in other areas (e.g. science)

A lot of progress was made. We know that the problem will not go away and need to keep up awareness, communication and motivation.

According to Nadia Manning, workshop facilitator, ILRI, *"The fishbowl worked well. It allowed a more structured, yet easy-flowing discussion amongst the 5 people in the middle of the fish bowl, which resulted in key ideas emerging and being properly evaluated and refined. It also encouraged more active listening amongst the 'public' whose silent focus was directed towards the discussant group in the middle. As the discussion grew and others felt more comfortable and confident to make a contribution, a wider set of perspectives were shared as members of the 'public' took over places in the centre group".*

In the evaluation at the end of the workshop- Dr Shirley Tarawali, Leader of the ILRI Theme on People, Livestock and Environment under which the Napier grass project is hosted, commented that *'the Fish Bowl was really effective at getting lots of ideas from the various stakeholders and project team members on what this project may or may not have achieved. Different people could share their ideas and these were discussed in a small enough group to properly examine to what extent such an outcome really was achieved. I am amazed at how much useful information was shared'.* Many other participants from Ministries, NARS, Universities and even a farmer commented that they had never been exposed to such a method, but they found it 'energetic', 'exciting' and a 'very positive approach for talking to each other'".

IV/ Poster session

A poster session followed where participants were able to share posters about their work both within the project and other work relating to forages and smallholder dairy systems. Key project partners presented their work on characterization: morphology, yield, disease tolerance, nutrition and molecular diversity. A special presentation was from a farmer in Uganda, who was passionate of the need for a solution to stunt as it was having serious social impacts in the community.

Other posters of project outputs gave information about survey results including disease prevalence and management strategies. The presentations led to lively discussion in the relaxed setting a cocktail, which made the event less formal and easier for participants to exchange and share about the project's outcomes.

"*The disease is true violence to me. We all have to be sensitized about using clean planting material*", Peter Ddaki, farmer (Masaka, Uganda) in front of his poster	Participants Bramwel Wanjala and Rob Skilton at the poster session discussing the molecular diversity of Napier grass clones

Following is the list of posters presented:

FROM UGANDA

-Evaluation of national collections of Napier grass clones for nutritive quality in Eastern Africa. *Sserubiri, C.;Hanson, J.;Proud, J.;Kabirizi, J.;Mulaa, M.;Pallangyo, B.;Mukiibi, E.*

-Strange Napier grass disease: its effect on smallholder dairy farmers in Masaka district*. Salongo Peter Ddaki, Kitenga village, Kalungu sub-county, Masaka district, Uganda.*

-Incidence and severity of Napier stunt disease in Uganda*. Kabirizi, J.;Kigongo, J.;Namazzi, C*.

-Napier stunt disease management in Uganda*. Kabirizi, J.*

-Morphological characterization of Napier grass clones collection in Uganda*. Mukiibi, E.*

FROM KENYA

-Morphological characterization of Napier grass collections in Kenya. *Awalla, B.J.;Mulaa, M.; Lusweti C.M.; Proud, J., Hanson, J.; Kute, C.*

-Molecular characterization of Napier grass germplasm by fluorescent labelled amplified fragment lenghth polymorphism (FL-AFLP). *Bramwel, W.; Muchugi, A., Mulaa, M.; Obonyo, M.; Harvey, J.; Skilton, R.; Proud, J.; Hanson, J.*

-Evaluation of Napier clones for biomass in Western Kenya. *Asena, D.; Mulaa, M.; Awalla, B.J.; Lusweti, C.; Hanson, J.; Proud, J.*

-Napier stunt and smut incidence severity and farmer's management practices in Western and Central Kenya*. Mulaa, M.; Cherunya, .A; Mutoko, M.; Lusweti, C.; Proud, J.; Hanson, J. and Mwendia, S.*

-Stunting disease incidence and severity on Napier grass in Kenya*. Mulaa, M.; Awalla, B.; Cherunya, A.; Wanyama, J.; Proud, J.; Hanson, J.; Lusweti, C. and Muyekho, F.*

-Status of Napier grass production and management in Western and Central provinces of Kenya. *Rono, S.C; Mulaa, M.; Mutoko, M.C.; Lusweti, C.; Lekwaloput, I; Ego, W.and Mukasa, B.*

FROM TANZANIA

-Napier grass diversity biomass and tolerance to diseases in Tanzania*. Pallangyo, B.; Maeda, C.; Proud, J.; Hanson, J.; Nsami, E. and Mkonyi, S.*

-Occurrence of Napier stunt disease and recommended management options in Tanzania. *Pallangyo, B.; Maeda, C.; Nsami, E. and Mkonyi, S.*

FROM ILRI

-A partnership approach to mitigate the effects of Napier diseases on smallholder dairy. *Poster by the Napier grass diseases resistant project for ILRI Board of Directors 2009, Addis Ababa, Ethiopia.*

-Mitigating the impact of Napier grass smut and stunt diseases for the smallholder dairy sector: key achievements. *Poster by Janice Proud, ILRI, for the ASARECA stall at the 5th African*

Agriculture Science Week and Forum for Agricultural Research in Africa (FARA) General Assembly, 19-24 July 2010, Ouagadougou, Burkina Faso.

To see content of posters, go to http://tinyurl.com/29n2pc5

Available abstracts can be found in Annex 3 of this document

DAY 2

I/ First session

The morning started with presentations on Molecular work on Napier grass.

***Evans Obura*,** who was working to identify the vector of Napier grass stunt for his PhD and is a researcher at ICIPE, started with Napier stunt disease is transmitted by a leafhopper vector *Maiestas (=Recilia) banda* in Western Kenya in which he reports that a leafhopper transmitting the disease has been identified, but he also asks: are the vectors a threat to cereal crops?

See the full presentation on http://tinyurl.com/237x6oc or read the abstract in Annex 3 of this document

Bramwel Wanjala, Researcher at KARI, Kenya, next presented on Molecular characterization of Napier grass (*Pennisetum purpureum* Schumach.) germplasm using fluorescent labelled amplified fragment length polymorphism (FL-AFLP). This work looked at the relationship between the clones in the collections in the region, to identify duplicates and related clones.

See the full presentation on http://tinyurl.com/34gy54d or read the abstract in Annex 3 of this document

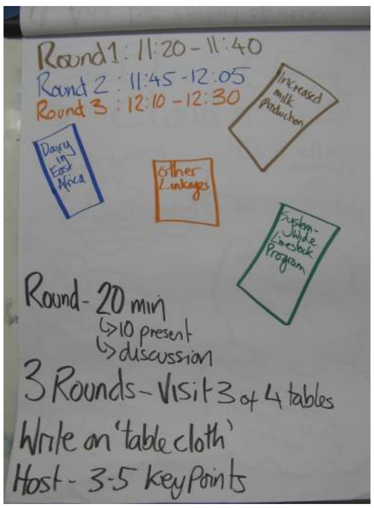
And to finish the session on molecular work, ***John Lucas***, from Rothamsted Research (UK), whose research aims at understanding how pathogenic species cause disease and to devise new or better ways of diagnose it, presented Napier grass stunt and head smut diagnostics, information about the work to sequence *Ustilago kamerunensis*, the causal agent of smut and develop diagnostic tools.

See the full presentation on http://tinyurl.com/26jwbe2 or read the abstract in Annex 3 of this document.

II/ Group presentations and discussions: Relationship between this project and other projects

A modified **Peer Assist** approach (http://www.kstoolkit.org/Peer+Assists) was used to explore how relationships between this project, with its valuable set of knowledge and results, and other projects could be forged. Nadia Manning, workshop facilitator, ILRI, explains the process: "Three tables were set up with a representative from other projects and lots of flip chart paper. There was also a fourth table known as the 'open bucket' table, which was hosted by the Project team.

- Dairy in East Africa project (Ben Lukuyu, ILRI)
- Napier grass as a tool for increased milk production (Hizikias Ketema, Food and Agriculture Organisation (FAO))
- Modeling results (Bruno Gerard, CGIAR System-wide Livestock Program)
- 'Open bucket' table (Julius Nyangaga, Napier grass project, ILRI)



The workshop participants were invited to visit three out of the four tables, for a 20 minute session each time. Each of the project tables introduced their project for 5 minutes and then asked the participants to discuss and brainstorm ideas for how those projects could link to the Napier project, make use of its results, and extend the work beyond the current (and ending) project. The 'open bucket' table was provided as an opportunity for participants to provide ideas on other projects, initiatives and opportunities for linkages, outreach, sharing of data and carrying forward the work of the Napier grass project.

This approach elicited a lot of ideas for moving the results and knowledge from the Napier grass project forward through other projects and institutions. This idea of achieving outreach and outcomes through sharing knowledge with key boundary partners to take forward with their own networks was particularly pertinent for the project"
See her blog posting following the workshop on http://tinyurl.com/38g2xne

***Ben Lukuyu* of the East Africa Dairy Development project** (EADDP) (http://eadairy.wordpress.com/) presented briefly about his project and discussed disseminating information on Napier (on improving production, on diseases) to the farmers and using the project networks to multiply tolerant materials and spread information.

Key points:

- EADDP found that farmers from Groups/Zones become feed producers by multiplying clean elephant (Napier) grass
- Awareness creation on Napier stunt disease in Rwanda is very urgent since it is disease free and is surrounded by infected countries (Tanzania and Uganda)

- Linking with other projects that are targeting Napier smut and stunt is important to gain access to better Napier feed productivity
- Link with East Africa Agricultural Productivity Programme (EAAPP) (feed analysis, breeding etc.)
- Important that plant protection authorities get the message about Napier diseases

To see full presentation, go to http://tinyurl.com/23soe7x

***Hizikias Ketema*, of FAO-Ethiopia**, gave an introduction to Napier grass as a tool for increased milk production, and facilitated the group discussion.

Key points:

- Milk provides added value for smallholder farmers
- Vigilance on sensitization of agricultural advisors and farmers on smut and stunt is important in Ethiopia as there is no awareness of the diseases
- Genetic diversity of materials being planted in FAO projects
- Linkages with other role players is crucial,
    - Harnessing research benefit from the EAAPP ,
    - Ethiopian Research system with other Napier grass research and NDDP (National Dairy Development Project)
    - Use FAO to link with new countries
- Data collection on milk production is important to get the economic impact of Napier grass

To see full presentation, go to http://tinyurl.com/38oy3jk

***Bruno Gérard* of the System-wide Livestock program**, ILRI, and group discussed SLP (http://vslp.org/),

B. Gérard first gave an overview of the SLP project on:

- Role of SLP to bring scientists from 12 CGIAR centers to work on better integration of crop and livestock productions in mixed systems
- Feed database
- Crop residue trade-off
- Evolving systems
- Conservation agriculture
- Funding mechanisms

The key points of the discussion were:

- Way to get a system approach, link to
    - Technology push-market pull

- Dual-purpose crops
- Models
  - Feed quality (NIRS values)
  - Natural Resources Management
  - Trade-off analysis
  - Nutrition
- Knowledge sharing
  - Web site
  - Brokerage role between partners
  - Both directions
- Develop methodologies and approaches which allow country and region analysis

At the 'open bucket' table, discussion took place around linkages, trying to answer the following questions: Is there an optimum number of partners and linkages for a project? How to link better and with whom?

Internal project linkages

The group reviewed linkages within the project and the challenges there have been, mostly focused on 'people'.

- ICIPE, Rothamsted
  - -understand constraints
  - -Roles, responsibilities
  - -Staff changes (no fall back position)
- Disciplines
  - -Clear about expectations
  - -Understanding of big picture
  - -Timing/staff and student changes can lead to delays

This frustrated the planned linkages between different elements of the project, e.g. identifying duplicates to reduce numbers for artificial challenge. The whole project suffered due to these delays.

Current external linkages:

These were at several levels, in particular research and knowledge sharing

- Research:
  - -Millenium Science Initiative, Uganda (National Crop Resources Research Institute, Titus Alicai)
  - -ICIPE
    - Capacity building on Napier stunt Kenya, Uganda, Tanzania
    - Push-pull (Tanzania, Uganda, Kenya)
  - -EAAPP works in Kenya, Uganda, Tanzania, Ethiopia
  - - for dairy regional centre of excellence is Naivasha, Kenya

-FAO: Capacity building on NSD- Uganda/IFAD: Competitiveness project

-SNV/ Sporometrics Canada. New Napier stunt project submitted for funds

- Knowledge sharing:

-CABI-Global Plant Clinic- KARI, Kenya

-Send-a-Cow, Uganda, NaLIRRI

-HPI, Gifts, EADD
-Universities (Makarere), schools, training
-Farmers groups, CBOs
-Extension services: NALEP (National Agriculture and Livestock Extension Programme) , NAADS (National Agricultural Advisory Services)
-Ministries, NGOs (Agric and Livestock)

Possible external links:

- ICRISAT (Pearl millet, breeders)
- BECA - Capacity building, MSc, PhDs, scientists
  - KEPHIS on molecular diagnostics
- University: continues training
- Future development partners scheme (Uganda),
  - AGRA, KAPP (KARI), Sci & Tech (KARI), Competitive Grant
  - Kilimo Trust
  - ASARECA (future calls)
  - CDF (Kenya)
- Heifer International: Alternative Forages (Kenya, Tanzania, Uganda)
- World Vision, other NGOs (CRS): dissemination:
  - UNEP: going green
  - NEMA
  - Private sector (Kenya seed company, Victoria seed Co (Ug))
- IFAD project in Kenya (expansion)
- Link project website to others
- SNV (dissemination)
- AIRC, radio stations, media, communication service providers (Uganda)

III/World café: Looking back, looking forward

In this particular exercise, we wanted to look back and reflect on lessons learnt from the project but also look forward to see how things can move forward after the project. For this important activity a 'world café' was used.

The World Café is a whole group interaction method focused on conversations. A Café Conversation is a creative process for leading collaborative dialogue, sharing knowledge and creating possibilities for action in groups of all sizes. The environment is set up like a café, with tables for four supplied with refreshments. People sit four to a table and hold a series of conversational rounds lasting from 20 to 45 minutes about one or more questions which are personally meaningful to them. At the end of each round, one person remains at each table as the host, while the other three travels to separate tables. Table hosts welcome newcomers to their tables and share the essence of that table's conversation so far. The newcomers relate any conversational threads they are carrying -- and then the conversation continues, deepening as the round progresses.

The questions for each table were:

1A/ What has been important for dissemination of:

- Best management practices to mitigate disease
- More resistant clones

1B/ What is needed to continue this now the ASARECA project is ending?

What linkages are needed?

2A/ What were the important things that helped to mitigate Napier grass diseases in the region?

2B/ What would be the key recommendations to another country in the region where

- Napier grass is important but they are not aware of Napier grass diseases?
- Napier grass is important and they have a serious disease problem?

3A/ What has been important to influence the impact of Napier grass diseases in the region?

3B/ What policies and regulations would you want put in place to support further R & D, manage and reduce disease spread in the region?

4A/ What were the key successes in participatory planning?

4B/What are the key things to take forward from this experience?

5A/ What were the key successes in communication of project outputs and outcomes?

5B/ What are the key things to take forward from this experience?

Table 1 hosted by Charles Lusweti, Pasture and Fodder Research Coordinator, KARI

1A/ What has been important for dissemination of:

- ***Best management practices to mitigate disease***
- ***More tolerant clones***

1B/ What is needed to continue this now that the ASARECA project is ending? What linkages are needed?

Important dissemination methods for information:

- Media events
- Radio, TV
- Leaflets and posters
- Newspaper

- Farmer field schools
- Demonstration plots
- Farmer field days
- Drama
- Agricultural shows

Important dissemination strategies for clones:

- ***Smut tolerant:***
  - Two clones: Kakemega I and Kakemega II
  - How: - Bulked at KARI Muguga and Kitale
    - Disseminated in central Kenya, North Rift valley, western Kenya through:
      - Agricultural training Centers for dissemination and training
      - CBO, farmers groups, for bulking
      - Direct to farmers
- ***Stunt tolerant:***
  - Clones identified by KARI Kitale, given to farmers for testing before dissemination

Uganda - no resistant clones, waiting for Kenyan clones

What is needed to continue?

- Give credit and acknowledge contribution to motivate to continued interaction
- Set up a Community of Practice (CoP)
- Break down barriers for synthesis of outputs

Funding needed for:

- Diagnostics to ensure clean planting materials
- Further evaluation of resistant clones
- Breeding of resistant clones
- Testing Integrated Pest Management (IPM) packages
- Dissemination of information including travel costs

BUT

Some activities can continue without extra funding:

- Information dissemination
- Use funds from other projects to co-disseminate information
- Local dissemination through “unofficial networks” + partnerships from this
- Needs personal commitment – COP

Linkages

Current linkages through which project members should push information:

- Institute
- Farmers
- Forums
- Stakeholders
- Donors

and not stop because money is finished

- COP:
    - Credit, acknowledge for building trust
    - Support each other
    - Share Information + opportunities
    - Give up ownership for new opportunities
    - Set up a PLATFORM?

Table 2 hosted by Ben Lukuyu, East African Dairy Development Project

2A/ What were the important things that helped to mitigate Napier grass diseases in the region?

2B/ What would be the key recommendations to another country in the region where

- ***Napier grass is important but they are not aware of Napier grass diseases?***
- ***Napier grass is important and they have a serious disease problem?***

The following recommendations were elaborated:

Important things that helped mitigate Napier grass disease in the region

- Research into the diseases
    - Causal organisms, vectors, spread mechanisms, characteristics the hosts etc hence providing new information about the problem
    - Predisposing factors, farming systems
    - Improved diagnostic methods
    - Genetic diversity in the Napier
    - Development of infrastructure
- Effective awareness creation of the diseases
    - Media
    - Workshops and seminars
    - Field days
    - Farmer to farmer
- High adoption rates amongst farmers of new Napier varieties, cultural practices to control the disease
- Rich indigenous knowledge amongst the communities (farmers) about the disease together with scientific knowledge as well.
- Integrated dissemination of information management of the disease
- Capacity building (human and physical) amongst stakeholders e.g. training, information sharing

Key recommendations to another country:

	Not aware of Napier diseases	Has a serious problem with Napier diseases
1	Create awareness about the diseases to policy makers and farmers	Create awareness about the diseases to policy makers and farmers
2	Effective quarantine regulations in control of movement of planting vegetative materials	Dissemination of control measures
3	Learn lessons from countries with Napier problem	Sourcing materials from tolerant planting material (in the short term)
4	Promote alternative sources of forages	Promote alternative sources of forages
5	Evaluation of the Napier provenances for tolerance and occurrence of vectors	Intensive collection to preserve diversity
6	Intensive collection to preserve diversity	Capacity building on diagnosis and disease management
7	Capacity building on diagnosis and disease management	
8	Put in place a surveillance mechanism of the disease at community level	

Table 3 hosted by Fransesca Katagira, Ministry of Agriculture, Tanzania

3A/ What has been important to influence the impact of Napier grass diseases in the region?

Factors limiting impact of the disease:

- Awareness has been created to dairy sector stakeholders
- Information/knowledge on disease etiology, management
- Intensify awareness creation

Factors with a negative impact on the disease:

- Intensification of Napier cultivation -
- Limited diversity of animal feeds -
- Climate change-
- Intensification of dairy farming -
- Promotion of zero grazing (ref. Kenya)

3B/ What policies and regulations would you want put in place to support further R & D, manage and reduce disease spread in the region?

- Create incentives for management of diseases
- Declare disease free areas
- Policies/regulations/measures to avoid spread of diseases
    - Movement of materials (quarantine) (screening of materials)
    - Napier diseases (smut and stunt) to be declared as outbreak diseases
    - Community managed policies
    - National pest surveillance system

Table 4 hosted by Titus Alicai, National Crop Resources Research Institute (NacRRI), Uganda

4A/ What were the key successes in participatory planning?

- Annual regional planning meetings
- Country meetings
    - Inception meetings
    - Stakeholder meetings

The meetings allowed reviews of progress and constraints and:

- Allowed review of monitoring indicators and changes/adjustments to be made
- Provided platform for inputs from different stakeholders at regional and country levels
- Facilitated exchange/sharing of information and other experiences between partners, other partners and general public
- Farmers provided feedback on their experiences with NSD[2] and their coping mechanisms
- Stakeholders (farmers) felt motivated and empowered
- Built relationships and linkages
- Participants acquired facilitation skills
- Promoted sense of ownership and self-motivation

4B/ What are the key things to take forward from this experience?

- Broaden partnership composition of core project team
- Include socio-economists in core team
- Involve related projects in planning events
- Document participatory planning process for future use
- Improve participatory process of goal building and monitoring; setting goals achievable within project period
- Should start at joint proposal development.

[2] NSD = Napier Stunt Disease. The Uganda stakeholders were more familiar with the Stunt disease and frequently use the abbreviation NSD for that particular problem rather than the Smut disease only observed in Kenya.

Table 5 hosted by Ben Ilakut, ASARECA, and Genevieve Renard, Napier grass project/ILRI

5A/ What were the key successes in communication of project outputs and outcomes?
5B/ What are the key things to take forward from this experience?

COMMUNICATION

Participants first felt necessary to establish the difference between *output* and *outcome* which were recurrent terms throughout the workshop. A *project output* is what you deliver (report, tool or practices, germplasm) and a *project outcome* is for instance any behavioral change, such as adopting best management practices, that you can see or measure.

The key successes of the project were then discussed:

- What was successful in terms of communication?
  - Everybody tried so many different things hoping something would work. You may achieve something by repetition but will only be successful if one can see behavioral changes.
  - You can reach a lot of people through various communication means but will they act? A survey of the media used is needed and could be included in M&E of the project.
  - Information should focus on:
    - What did we deliver?
    - How did we deliver?

      Ex: In Uganda, Mr. Ddari (farmer present at workshop) appreciated seminars, face to face contact with researchers-

      Ex: Getting to opinion leaders is a good way to break down information

      Ex: In Kenya, television is a powerful media,

  - But need to use more than one communication channel.
  - Multiple channels are important for the project and its different audiences.
  - The website is a major achievement for instance but only one of the channel.

- And when project is over?
  - Information collection center (one person) who could upload/handing over of website.
  - NARO: information development updating, Information services /Link big section in manual on Napier grass
  - Reaching farmers but the science component is strong and should be pursued through scientific articles (e.g abstracts published on website)
  - Need to communicate about science more.
  - Need to communicate about gaps (in project reports? In the way forward section?)

- Website not necessarily needs to be maintained.
    - List of all assets and map them, store knowledge assets on different portals (FAO, etc) properly tagged, those assets will appear
    - Better base longer life
    - But biological info needs to be in sound repository database
    - Management of database is revolutionary and could be resource for future funding (plant virus database by retired scientist)
        - Make an inventory of assets
    - Where to "send" them?
        - E.g. FAO could get these databases, long term project
        - Long term sustainability
        - Can be recombined with other assets
- Agricultural network of information.
    - Information at the country not yet captured
- Mini survey about socio-economic data
- Need of a social scientist

IV/ Evaluation of the workshop

Nadia Manning then proceeded to a quick evaluation of the meeting (graphic facilitation), asking participants to score content, process and networking during the two-day workshop.

Pictures hereafter show the before and after evaluation process.

While many of the techniques used to run the meeting were new to participants, they were generally happy with the workshop, content, process and networking/linkages. Many said that they would try these in their local setting, another succesful capacity building opportunity.

V/ Closing remarks

In her closing remarks, Sarah Mubiru, ASARECA representative, thanked everyone for participating and shared a story in which a man brought to God asks to see Hell and Heaven. In Hell, people have bowls of soup but spoons too long to drink or eat and it is chaos. In Heaven on the other hand, people with the same bowls and long spoons feed each other, in order and calm.

Mubiru then told the group that similarly ASARECA prides itself in partnerships, carrying out fruitful research while hoping to improve livelihoods by working together. ASARECA funds projects to “work locally” but wants to see the impact regionally, through linkages and dissemination. This project has achieved that goal with strong national teams addressing local issues, working together across the region to support each other and using the website to make the project results available worldwide.

Jean Hanson, Forage project Leader, then thanked everyone and commented on the positive outputs and progress made over the past three years.

Annex 1: Workshop’s programme

Regional ASARECA workshop: **Mitigating the impact of Napier grass smut and stunt diseases for the smallholder dairy sector: Sharing results**		
Wednesday 2nd June, Large Auditorium, ILRI-Addis		
Registration Welcome Introductions Opening remarks Introduction to project	Janice Proud, ILRI Shirley Tarawali, ILRI Participants Sarah Mubiru, ASARECA Janice Proud, ILRI	9.00 – 10.00
Coffee	Posters to Info Centre Collection of receipts	10.00 – 10.30
Achievements and outcomes Kenya Tanzania Uganda ICIPE	 Margaret Mulaa, KARI Beatrice Pallangyo, NBCP Jolly Kabirizi, NaLIRRI Charles Midega, ICIPE	10.30 – 1.00 4 x 30 min 30 min discussion
Lunch	Posters to Info Centre Collections of receipts	1.00 – 2.00
Website and communication Outcome mapping as a tool for M&E	Genevieve Renard, Esther Gacheru, ILRI Julius Nyangaga, ILRI	2.00 – 3.00
Tea		3.00 – 3.30
Interactive discussion: - outcomes and impact of the project on small holder dairy farmers in East Africa	Discussion on the outcomes and impact, as perceived by a range of stakeholders	3.30 – 5.00
Break	Check posters	5.00 – 5.30
Poster and cocktails	InfoCentre	5.30 – 6.30

Thursday 3rd June, Large Auditorium, ILRI-Addis		
Epidemiology of Napier grass stunt – Vector studies Molecular studies Characterisation of Napier grass Disease diagnostics	Evans Obura, ICIPE Bramwel Wanjala, KARI John Lucas, Rothamsted Research	8.30 – 10.30 3 x 30 min 30 min discussion
Coffee		10.30 – 11.00
Group presentations and discussions: Relationship between this project and other projects Dairy in East Africa Napier grass as tool for increased milk production Modeling results	Ben Lukuyu, East Africa Dairy Development Project Emmanuelle GuerneBleich, Livestock officer, FAO* Bruno Gerard, System-wide Livestock Program	11.00 – 12.45
Lunch		1.00 – 2.00
Thematic discussions:	Looking back, looking forward	2.00 – 3.15
Tea		3.15 – 3.45
Plenary – report back	Reporting back on group discussion	3.45 – 4.30
Evaluation	Feedback on meeting	4.30 – 4.45
Closing remarks	Sarah Mubiru, ASARECA Jean Hanson, ILRI	4.45 – 5.00

***Hizikias Ketema*, of FAO-Ethiopia**

Annex 2: List of participants, e-mail addresses and group picture

Mitigating the impact of Napier grass smut and stunt diseases for the smallholder dairy sector: Sharing results

2 - 3 June 2010, Addis Ababa, Ethiopia

	Name	**Organisation**	**e-mail addresses**
1	Charles Midega	ICIPE, Kenya	cmidega@icipe.org
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30	Nadia Manning-Thomas	ILRI/ICT KM, Addis	n.manning@cgiar.org
31	Shirley Tarawali	ILRI, Addis Ababa	s.tarawali@cgiar.org

Group picture, ASARECA workshop, June 3rd 2010, ILRI, Addis Ababa

Annex 3: Available abstracts

List of abstracts:

-Evaluations of national collections of Napier grass clones for nutritive quality in East Africa
Namazzi C.S, Kabirizi.J, Hanson J, Proud J, Mulaa M, Pallangyo B;

-Napier grass stunt management in Uganda
Kabirizi, J.; Proud, J.; Nakiganda, A.; Taabu, L.; Kigongo, J.; Namazzi, C. Sudhe, C., S.; Namagembe, A.; Kayiwa, S.

-Morphological characterization of Napier grass (*pennisetum purpureum*) clones collection in Uganda
Mukiibi, E.

-General information on households and farming systems in surveyed districts in western Kenya
Rono S. C, Mulaa M., Mutoko M. C., Lusweti F.N, Lekwaloput I. and Mukasa B.

-**Stunting disease incidence and severity on Napier grass in Kenya**
Mulaa, M, Awalla B, Cherunya, A, Wanyama ,J, Lusweti ,C. and Muyekho ,F.

-Molecular characterization of Napier grass (pennisetum purpureum schumach.) germplasm by fluorescent labelled amplified fragment length polymorphism (fl-aflp)
Bramwel Wanjala

-Napier grass diversity, biomass and tolerance to Napier stunt disease in Tanzania
Pallangyo, B., Maeda C, Proud J Hanson J, Nsami E and Mkonyi S.

-**The transmission of 16srxi phytoplasma, to Napier grass in Eastern Africa, is by a leafhopper vector *maiestas (=recilia) banda* kramer (auchenorrhyncha: cicadellidae)**
Evans Obura, Charles A. O. Midega, Daniel Masiga, John A. Pickett, Mohamed Hassan, Shinsaku Koji and Zeyaur R. Khan

-Molecular diagnostics for Napier grass stunt (ngs) and napier head smut (nhs) diseases
John Lucas and Yaima Arocha

FROM UGANDA:

EVALUATIONS OF NATIONAL COLLECTIONS OF NAPIER GRASS CLONES FOR NUTRITIVE QUALITY IN EAST AFRICA

[1]Namazzi C.S, [1]Kabirizi.J, [2]Hanson J, [2]Proud J, [3]Mulaa M; [4]Pallangyo B;

[1] National Livestock Resources Research Institute (NaLIRRI), Uganda
[2] International Livestock Research Institute (ILRI), Ethiopia
[3] Kenya Agricultural Research Institute (KARI), Kenya
[4] National Biological Control Program (NBCP)- Tanzania

Abstract

Napier grass clones selected from national collections in East Africa were established at Alupe, Kibaha and Namulonge in Kenya, Tanzania and Uganda respectively, to assess nutritional diversity and to determine the effects of stunt and smut diseases on nutritive value. Two hundred and six (206) Napier grass clones were scanned using Foss Model 5000 Near Infrared reflectance Spectroscopy (NIRS). Six percent (6%) of the samples were analysed for crude protein, neutral detergent fibre, acid detergent fibre, ash, dry matter and acid detergent lignin as reference data. Spectra information and chemical data were regressed to develop NIRS calibration equations which were used to expand ILRI NIRS calibrations equations to predict Napier grass clones in East Africa.

Data was analysed using General Linear Model option of SAS 2001. Cluster analysis was used to group clones with similar character together. Relative Feed Value (RFV) was used to assess quality and compare nutritional values of different clones.

Results showed that there was variation in nutritional traits of Napier grass clones across the three countries. Clones from the same country showed tendencies of clustering together, indicating nutritional background to be related. Clones from the region were clustered according to the country except a few of them which were scattered, which showed nutritional diversity. There was no effect of stunt and smut diseases on the nutritive value of Napier grass.

NAPIER GRASS STUNT MANAGEMENT IN UGANDA

[1]Kabirizi, J.; [2]Proud, J.; [1]Nakiganda, A.; [1]Taabu, L.; [1]Kigongo, J.; [1]Namazzi, C. [1]Sudhe, C., S.; [1]Namagembe, A.; [1]Kayiwa, S.

[1]National Livestock Resources Research Institute (NaLIRRI), Uganda;
[2]International Livestock Research Institute (ILRI), Addis Ababa, Ethiopia
[3]National Crops Resources Research Institute (NaCRRI), Kampala, Uganda

Abstract

Napier grass provides over 80% of the fodder required by smallholder dairy farmers in Uganda. Napier grass production is threatened by the emergence of Napier stunt disease (NSD). Baseline surveys were conducted in Kabalore, Masaka and Soroti districts to assess incidence and severity of NSD disease and identify management strategies used to control NSD. The districts were selected based on agro-ecological zones, importance of Napier grass fodder and improved dairy cattle production system and accessibility of the district.

Survey results showed that over 80% of the households in the sampled districts had 1-3 acres of planted Napier grass fodder. Majority (over 90%) of the respondents used Napier grass cuttings to establish Napier grass fodder and this was planted either in a plot or on boundaries of banana or coffee fields. In Masaka district, over 70% of the sampled farms had been affected by NSD. In Soroti district, Napier grass growing associated with dairy farming was not commonly practiced because majority (over 70%. n=55) of the farmers were engaged in extensive or communal grazing. Although all sampled districts were affected by NSD, Masaka district was most affected. In Kabalore district which is about 1,530 meters above sea level NSD incidence level was less than 10%. Major method of controlling NSD was manure application and rouging. Farmers reported receiving information on NSD control methods from fellow farmers, workshops, Non Governments Organizations and researchers.

In conclusion,, NSD a big threat to the livestock industry in Uganda. Majority of farmers lack knowledge on management of NSD. Farmers lack clean planting materials. There is therefore a need to continue sensitizing farmers using all available methods (media, manuals seminars, drama etc) and establish multiplication sites for clean planting materials. Efforts should be made to avail farmers with clean planting materials.

MORPHOLOGICAL CHARACTERIZATION OF NAPIER GRASS (*PENNISETUM PURPUREUM*) CLONES COLLECTION IN UGANDA

Erasmus Mukiibi
National Crops Resources Research Institute, Kampala, Uganda

Abstract

Napier grass fodder (Pennisetum purpureum) is a major forage in smallholder dairy cattle and goat production systems in Uganda. Since 2000, symptoms have been seen on Napier grass in Uganda that include foliar yellowing, little leaves, proliferation of tillers and shortening of internodes to the extent that clumps appear severely stunted. Fifty six Napier grass clones therefore collected from Kabalore, Masaka and Soroti districts were planted in a germplasm collection at National Crops Resources Research Institute and characterized using 9 morphological characters. The objective of this study was to increase Napier grass diversity contribution to animal feed resources to enhance productivity and sustainability of smallholder livestock systems in Uganda through evaluation of Napier grass clones for diversity.

Results indicated that the collection was less variable and some clones were similar and these may be duplicates. The collection formed 7 groups based on morphological characters. This finding is of value for further evaluations. Clone K23 formed own group. The 3/7 groups reflected area of collection of the clones. Within group similarity was less than 100%.

FROM KENYA

GENERAL INFORMATION ON HOUSEHOLDS AND FARMING SYSTEMS IN SURVEYED DISTRICTS IN WESTERN KENYA

Rono S. C, Mulaa M., Mutoko M. C., Lusweti F.N, Lekwaloput I. and Mukasa B.

Kenya Agricultural Research Institute, Kitale, KENYA

Abstract

One of the major challenges in many sub-Saharan African governments is the increasing human population against the slow and declining agricultural growth rate. According to the 1999 population and housing census, the human population has increased tremendously compared to 1979 and 1989. The total Kenyan population is estimated to be about 30.4 million with an annual growth rate of about 2.4%. Western province has 28 districts covering an area of 8,435 Km^2 with a population of 4.5 million people and 827,000 farm families. Livestock plays an important economic and social role in farm household economies. Due to their importance their numbers have been increasing over years since independence. Area under pastures and fodders is reducing over years. The acreage under pastures and fodders is relatively small compared to food and cash crops. However, of the improved pastures Napier grass (elephant grass) is the most adopted across all the AEZs and districts. By year 2004 it was estimated that the Napier stunting disease had affected the Napier crop across 23,298 km^2. About 2 million households comprising 9 million people (30% of the population) in Western Kenya and the Rift Valley provinces. A survey was carried out in 2008 with the following objectives: To collect baseline information on farmers Napier production and livestock management practices, Map out distribution and severity of stunt disease and to collect Napier clones tolerant to stunt for further screening. The districts surveyed were: Bungoma, Mumias, Butere and Busia in Western Kenya. A total of 551households were interviewed. The results showed that 98% in Butere, 96% in Mumias, 90% in Bungoma and 87% in Busia of farmers had noticed some diseases on the Napier in their districts. Over 20% of the households interviewed keep 1-2 dairy cows in their homestead. Area planted with Napier grass ranges between 0.25 to over 10 acres, with majority planting less than 0.5 acres. Majority of farmers 65% source Napier planting material from neighbors and less than 5% sourced material through Extension and Research Institutions. There should be bulking sites of clean planting material in identified fields and farmer/extension/research linkages should be improved. Majority of farmers (40%) prefer fast growing varieties of Napier with high herbage yield. The most practiced feeding system is semi-intensive and tethering grazing. Napier grass stunt disease (NGS) is the most serious threat to smallholder dairy production and something should be done in order to save dairy industry from collapse.

Key words: survey, Napier grass, stunt disease

STUNTING DISEASE INCIDENCE AND SEVERITY ON NAPIER GRASS IN KENYA

Mulaa M[1], Awalla B[1], Cherunya A[1], Wanyama J[1], Lusweti C[1] and Muyekho F[2]

KARI Kitale and KARI Kakamega, Kenya

Abstract

Napier stunting disease is a major constraint in dairy production in Kenya. The disease causes stunted growth and reduction in Biomass. The objective of the study was to screen for tolerant clones to stunting disease. 400 Clones of Napier Grass were collected from Bungoma, Mumias, Butere and Busia Districts in Western Kenya in 2008. The clones were then planted in a nursery at Alupe for observation. 120 Disease free clones with diverse Morphological characteristics were selected and planted in a replicated trial for further screening. 83 cloned without disease symptoms were planted in a replicated trial in a screen house and were artificially challenged with the stunting disease using leafhoppers collected from the Napier grass fields in Alupe. Napier diseased plants were planted around the trial to serve as spreader rows. Harvesting of Napier was done at intervals of 8 weeks and data was collected on the incidence and severity of stunting disease using a scale of 1-4, where 1 was no symptoms and 4 was severe. Both fresh and dry matter yield data was collected for each plot and Analysis of data done using SAS. The clones were significantly different (P=0.05) from each other in terms of severity and incidence at every harvest. The trends in the incidence of the stunting disease varied in different clones, for the very susceptible clones the stunting disease started appearing right from the first harvest and the incidence increased as early as the second cut. While for tolerant clones the disease symptoms started appearing at fourth harvest. Out of 320 plots of Napier in the replicated trial 198 had disease incidence of score 2-3 at 4th harvest. Only 20 clones out of 120 clones screened did not have any symptoms of stunting disease by the fourth harvest. 10 clones were very susceptible with severity ranging between 2.7 and 3. The most susceptible and low yielding being: BTR1A5 (2.22 tons/ha), MM1A4 (3.55tons/ha), MM1B30 (3.72 tons/ha) and BGM2A12 (5.39tons/ha). Clones which were tolerant to stunt and high yielding with dry matter yields ranging from 6tons per ha to 10 tons per ha were BSA 1A2, Extra B3, BGM 1A1, Extra C3, BGM3B24, MMS1A10, BSA2B28. Clones which were tolerant to stunt and were also ranked high by the farmers using their own criteria were: MMS3A5, BGM3A5, MMS2A5, BGM3A9 and MMS2B26. These clones could be screened further on farm and recommended to farmers. While those clones which did not have any disease symptoms but were low yielding could be artificially challenged and find out if they contain resistance genes which could be used in the breeding program to improve the high yielding Napier with desirable characteristics.

Key Words: Napier Grass Clones, Disease incidence and severity, tolerant, farmer criteria

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MORPHOLOGICAL CHARACTERIZATION OF NAPIER GRASS (*Pennisetum purpureum*) IN KENYA

Awalla, B.J., Mulaa M, Lusweti C.M. and Kute C.

Kenya Agricultural Research Institute, Kitale, KENYA

Abstract

Napier grass is one of the major fodder grasses adapted by Kenyan small scale dairy farmers. The main attributes to its adaptability is because of high herbage yield, easy establishment, rapid regeneration *relatively high quality for utilization, and tolerance to drought. Dairy cows feeding on Napier grass alone can produce 7-10 litres of milk on average compared to less than 6 litres per cow per day on natural pastures. Despite being a source of feed, Napier grass has other potential uses such as protection of soil erosion and management of cereal stem borers. There are several clones grown by farmers and Kenya Agricultural Research Institute (KARI) holds over 60 accessions majority of which do not have descriptions and hence it is not easy to differentiate these materials from others in the different Agro-Ecological zones. This problem has made it even difficult for farmers and Extension workers to identify true to type clones. Napier grass has a narrow genetic base and any threat of disease may wipe out the present Napier varieties. Due to this genetic narrowness the Kenyan varieties recommended for on-farm production has started breaking down. Morphological characterization can be used to distinguish different clones and is also a powerful tool used by plant breeders to incorporate desired traits of one plant (donor) to another plant (recipient). In this study, characterization was done on 120 clones collected from four districts in Western Kenya (Busia, Bungoma, Mumias and Butere). Three major characteristics studied using recommended protocols were Growth habit, Leaf characteristics and Stem characteristics. Data collected was analyzed using SAS. Variation was observed between clones with the highest variation being observed in stool diameter having LSD of 23.06 while node hairiness showed the least variation with LSD of 0.206. Correlation was observed between adaxial hairiness and node hairiness with a co-efficient of 0.21. A negative correlation was observed between stool diameter and leaf width with a coefficient of -0.37 using Pearson correlation at significant level of 0.01. Generally, there was little variation in hairiness, whether adaxial, abaxial, at the nodes, sheath and seratteness of the leaves. These results will be compared with those found from the molecular characterization and will be used to assist in future development of varieties with desirable characteristics and distinct characteristics for easy identification of similarities in clones.*

Key words: Morphology, variation, correlation

PERFORMANCE OF NAPIER GRASS WITH LEGUME MIXTURES UNDER DIFFERENT PRODUCTION METHODS IN WESTERN KENYA

C.M. Lusweti, F.N. Muyekho[1]

KARI, KITALE,[1] and KARI Kakamega, Kenya

Abstract

The limited supply of quality fodder particularly in terms of nitrogen, when combined with small quantities of purchased concentrates, results in average daily milk yields of 6 litres from high grade dairy cows. Utilization of forage legumes appears to be a low cost method of enhancing both quality and quantity of livestock feeds on small holder farms, since they are high in protein content. Legumes can also concurrently enhance soil fertility for companion fodder grass. Various forage legumes can be intercropped with Napier grass to increase the quality of feeds produced but they do not persist for more than 2 years when conventional method of planting Napier grass is used. Therefore, in this study, Napier grass (Pennisetum purpureum K. schum) and four forage legumes were evaluated at KARI Kitale located *in UM_4 over a period of 2 years (1997-1998) with the following objectives: (a) to determine the dry matter yields and quality of feeds produced when forage legumes are intercropped with Napier grass that was planted by "Tumbukiza" (a new method of planting Napier grass) and Conventional methods of Napier production (b) to assess the persistence of legumes under the two methods of production. The treatments were (i) Desmodium uncinatum with Napier grass conventionally planted (2) D. uncinatum with Napier grass planted in "Tumbukiza" holes (3) Dolichos lablab cv. Rongai with Napier grass conventionally planted (4) D. Lablab with Napier grass planted in "Tumbukiza" holes (5) Sytlosanthes scabra with Napier grass planted conventionally (6) S. scabra with Napier grass planted in "Tumbukiza" holes (7) Glycine wightii with Napier grass planted conventionally and (8) G. wightii with Napier grass planted in "Tumbukiza" holes. The treatments were evaluated in a randomized complete block design replicated three times with plot sizes measuring 4.7 x 5.4m (conventional) and Tumbukiza holes measuring 60 x 60 x 60cm (depth, length, width respectively). Dolichos lablab significantly outyielded the other legumes under both methods of planting Napier grass. Napier grass dry matter yields were significantly ($P<0.05$) reduced by Dolichos lablab when intercropped in the conventional method of planting. Total dry matter yields (Napier + legume) were not significantly affected by the legumes in both methods of production. This was attributed to the compensatory effects caused by the legume herbage yields in plots where Napier grass yields were low. All the legumes in this study did not persist in the Napier grass crop during the second year irrespective of the method of production. Crude protein percentage was improved by the presence of D. Lablab, though not significantly at ($P<0.05$). Digestibility and other nutritive qualities were not significantly improved and this was attributed to the low legume content in the Napier grass herbage. The study has showed that both "Tumbukiza" and Conventional methods do not enhance legume persistence in Napier grass. Similarly, Dolichos lablab can perform well in both methods of planting Napier grass compared to other legumes and it should not be intercropped with Napier grass under conventional method because it reduces its productivity. Both methods do not increase total yields but the quality of feed was slightly improved by the intercropping of legumes in both methods.*

Key words: Napier grass, legumes methods of production, dry matter yields

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MOLECULAR CHARACTERIZATION OF NAPIER GRASS (*PENNISETUM PURPUREUM* SCHUMACH.) GERMPLASM BY FLUORESCENT LABELLED AMPLIFIED FRAGMENT LENGTH POLYMORPHISM (FL-AFLP)

Bramwel Wanjala

Kenya Agricultural Research Institute, Nairobi, Kenya

Abstract

Napier grass (Pennisetum purpureum Schum.) is an important forage crop for dairy production systems in the tropics. The species show phenotypic variation such as disease and pest resistance and abiotic stress tolerance. However there is little information of the genetic variability among the available Napier germplasm. This study analysed genetic diversity of 281 Napier grass cultivars collected from Kenya, Tanzania, Uganda and the International Livestock Research Institute Forage Germplasm, using amplified fragment length polymorphism (AFLP) markers. Out of the 64 AFLP primer pairs screened, five primer pairs produced a total of 216 polymorphic bands. The number of AFLP fragments generated per primer *set ranged from 50-115. Mean percent polymorphic loci was 63.40%. Population genetic diversity estimates ranged from 0.0783- 0.2130. Both the PCA and dendrogram showed no clear cut genetic differentiation among the populations sampled implying cases of high germplasm exchange within the region. Nei unbiased genetic distance between populations ranged from 0.0000-to 0.134 while the genetic identity ranged from0.8750–1.001. Shannon's information index was 0.0266-0.3445 an indication of low genetic diversity within the Napier grass cultivars. AMOVA analysis indicated more variation within (91%) than between populations (9%). Most of the germplasm lines are derivatives of open pollination and very few are the result of targeted crossing and mutation and complete pedigree information is not available for many accessions. Large-scale germplasm exchanges have been made without maintaining the identity and often name of a known cultivar was given to a new accession or a sample of known cultivar received a different local names.The AFLP markers developed will help future Napier cultivar identification, new cultivar development and germplasm conservation.*

Key words: AFLP markers, genetic diversity and Napier grass germplasm

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FROM TANZANIA

NAPIER GRASS DIVERSITY, BIOMASS AND TOLERANCE TO NAPIER STUNT DISEASE IN TANZANIA

Beatrice Pallangyo[1], Maeda C[2], Proud J[3] Hanson J,[3] Nsami E[1] and Mkonyi S[1]

[1] National Biological Control Programme P.O.BOX 30031, Kibaha, Tanzania
[2] International Institute of Tropical Agriculture P.O.BOX 6226, Dar es Salaam
[3] International Livestock Research Institute P.O.BOX 5689, Addis Ababa, Ethiopia.

Abstract

Napier grass, Pennisetum purpureum (Schumach) is widely adopted among fodder grasses in Tanzania. It is considered high yielding and nutritious among others, which were introduced in the country to alleviate the problem of shortage of animal feeds. However, the production of this grass is threatened by Napier Stunt Disease (NSD). Baseline survey conducted in 2008, established occurrence of the disease in Eastern, Northern and Lake Zones, and efforts to identify NSD resistant clones were initiated. Thirty (30) Napier clones were planted in randomized block design and evaluate biomass and tolerance to natural NSD infection for three seasons; long rains, dry and short rains. Results showed an increase of NSD incidence with cutting frequency, 20%, 30% and 73% in long rains, dry and short rains respectively. Fresh clump weight, dry matter content, leaf stem ratio and number of tillers varied from one clone to another being higher in clone 1, 2, 6, 8, 11, 25 and 30. Seven (7) clones including 4, 6, 11, 17, 24, 25 and 26 did not show NSD symptoms in all seasons. Three clones including clone 11, 6 and 25 produced higher biomass and also did not show NSD symptoms in all seasons. The three clones are recommended for further evaluation to confirm resistance to NSD before distributing them to farmers.

FROM ICIPE

THE TRANSMISSION OF 16SRXI PHYTOPLASMA, TO NAPIER GRASS IN EASTERN AFRICA, IS BY A LEAFHOPPER VECTOR *MAIESTAS (=RECILIA) BANDA* KRAMER (AUCHENORRHYNCHA: CICADELLIDAE)

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Abstract

In Eastern Africa, Napier grass, Pennisetum purpureum, is cultivated for livestock fodder, environmental protection and to manage cereal stem-boring Lepidoptera. However, the continued utility of Napier grass in the region is hampered by Napier stunt disease (NSD). Affected plants show severe stunting, profuse tillering and lethal yellowing. Two phytoplasma groups were implicated: the rice yellow dwarf (RYD) and the Western X-disease (16SrIII) phytoplasmas, all reported in eastern Africa. We determined the transmission mechanism of 16SrXI-NSD in Kenya. Five leafhoppers and 3 plant hoppers (Hemiptera: Auchenorrhyncha) were collected from Napier grass canopy and tested for phytoplasma transmission under laboratory conditions, for 90 days. NSD susceptible Napier grass clone at ICIPE's TRO campus was tested. Both the insect and plants were assayed for phytoplasma by nested polymerase chain reaction using P1/P6-R16F2n/R16R2 oligonucleotides. Nested PCR analyses showed that 58.3% of plants exposed to Maiestas banda Kramer (Hemiptera: Cicadellidae) were positive for phytoplasma and developed characteristic stunt disease symptoms while 60% of M. banda insect samples were similarly phytoplasma positive. The nucleotide sequences of the phytoplasma isolated from M. banda and Napier grass had 99% sequence homology. Both phytoplasmas had highest similarity to Ca. P. oryzae. Other species of Maiestas also vector phytopathogenic organisms. M. dorsalis (Motschulsky) vectors rice dwarf phytoreovirus, rice gall dwarf phytoreovirus, and rice orange leaf (ROL) phytoplasma in Asia. M. mica is the vector of blast disease phytoplasma in oil palm seedlings in West Africa. The vector discovery is novel for the management of NSD in eastern Africa. A mass colony of M. banda has been established on Napier grass at ICIPE's TRO campus, in Western Kenya. The colony serves as source of phytoplasma inoculum for Napier grass germplasm survey and to determine phytoplasma transmission to other grasses, especially food crops. The vector is also discriminated by specific control methods.

Keywords: Napier stunt disease, 16SrXI phytoplasma, Maiestas (=Recilia) banda.

FROM ROTHAMSTED

MOLECULAR DIAGNOSTICS FOR NAPIER GRASS STUNT (NGS) AND NAPIER HEAD SMUT (NHS) DISEASES

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Abstract

Diagnostic tests were developed for the group 16srXI 'Candidatus Phytoplasma oryzae' infecting Napier Grass in Kenya and Uganda, and the group 16SrIII phytoplasma in Ethiopia. Primers were designed based on sequences flanking the phytoplasma rDNA for use in a nested PCR assay that improves the accuracy and specificity of the test. RFLPs are used to provide a preliminary classification of the phytoplasma groups with confirmation by sequencing of the partial 16S rDNA product. An assay based on Non-radioactive nucleic acid hybridization (nrNAH) has been developed and currently a reverse-transcription Loop Mediated isothermal amplification (rtLAMP) assay is being evaluated for detection in the field.

Cultures of smut fungi were isolated from infected inflorescences of Napier Grass from Kenya and Bermuda Grass (Cynodon) from Ethiopia. These showed some morphological and microscopic differences, but both shared cultural characteristics typical of grass smuts from the Genus Ustilago. DNA was isolated from three different isolates from Napier as well as the Cynodon isolate, and PCR performed with primers targeting fungal ITS and β-tubulin regions. This yielded products of the expected size (760 bp from ITS and 860 from β-tubulin). The PCR products were purified and sequenced, and BLAST comparisons made with sequences deposited in Genbank. Alignment and phylogeny analysis of the sequences confirmed the Cynodon isolate as Ustilago cycnodontis and placed the Napier isolates as close to, but distinct from, other smut fungi of tropical grass hosts such as U. trichophora (no U. kamerunensis sequences are present in Genbank). Diagnostic primers based on the β-tubulin sequence from putative U. kamerunensis were designed and used to detect the smut fungus in PCR assays of samples from infected Napier clones. A non-radioactive nucleic acid hybridisation assay based on a β-tubulin probe was tested and gave positive signals for PCR products from all four smut isolates but was not sensitive enough to detect the pathogen directly in infected plant samples. Further work is required to increase the sensitivity and specificity of the smut probe, and to evaluate alternative assay formats.