

Manual for the Successful Implementation of Small-Scale Grower Projects



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Purpose of this manual

This manual serves as a guideline for Extension personnel, project managers and other agencies involved in development projects promoting the successful adoption and implementation of development projects for small-scale growers.

The manual is laid out according to the various planning activities and implementation steps during a project and includes examples of supporting documentation and training tools attached as appendices.

This successful methodology has been developed, tested and implemented in several small-scale grower areas with great success. The methodology has resulted in the adoption of sugarcane as a viable crop choice by many communities, and has shown repeatable, measurable improvement in sugarcane yields and thus the livelihoods of the targeted small-scale growers. The methodology also ensures annual spatial growth of projects so they become integral to the socio-economic upliftment of communities through improved income generation, job creation and the overall growth of the industry.

The manual serves to ensure continuity of extension services and mentorship of on-going projects in communities in the event of resignation or appointment of new officials. The methodology can also be used to evaluate and assess the impact of Extension and Extension Officers in an area.

ACRONYMS:

AEO	- Agricultural Extension Officers
CARA	- Conservation of Agricultural Resources Act 43 of 1983
NEMA	- National Environmental Management Act 107 of 1998
ES	- Extension Specialist
DAEA	- Department of Agriculture and Environmental Affairs
SASRI	- South African Sugarcane Research Institute
SASA	- South African Sugar Association
SSG	- Small-Scale Growers
PoW	- Programme of Work
TA	- Traditional Authority
GPS	- Global Positioning System
RV	- Recoverable Value
P&D	- Pest and Diseases
NGO	- Non-Governmental Organisation
BRP	- Bioresource Programme
VCC	- Variety Control Committee
FAS	- Fertiliser Advisory Services
PD&VCC	- Pest Disease and Variety Control Committee



Introduction

The South African Sugar Industry depends on a steady and reliable supply of sugarcane from the field (sugarcane growers) to the sugar mills. In South Africa, commercial sugar production has virtually reached a plateau due to the loss of agricultural land to non-agricultural development, competition for land with other crops such as timber, land degradation, the inherent loss of soil fertility and increasing input costs - all of which restrict the economic viability of the crop. In addition, only limited increases in yield (estimated between 10 and 15%) are possible on existing commercial farms. This can be attributed to the development of new varieties, better management practices, utilisation of marginal land with limited production potential and improved disease control. However, the South African sugar industry remains under pressure to stabilise the supply of sugarcane to the mills, many of which are operating below optimal capacity. The greatest opportunity for the industry, in terms of further significant spatial expansion, lies in the small-scale grower and communally-owned areas.

In the past, extensive investment capital has been channelled into KwaZulu-Natal small-scale grower projects with little or no success, as many of these projects have failed. Small-scale grower projects have a poor track record in terms of production and sustainability, and require routine continuous support and management. The reasons for this include a lack of access to capital and resources, a lack of technology, poor natural resource management and complex issues such as land tenure and security. This has led to the perception that small-scale growers have little chance of being successful in the long term, or that cane growth will be poor and economically unsustainable. A new extension approach was required to ensure the successful adoption and implementation of development projects.

A methodology which ensures successful implementation of small-scale projects is particularly valuable since much of the land available to small-scale growers is highly suited to the production of sugarcane. Historically, many of these areas are the poorest and least developed due to the many challenges that face small-scale growers. The South African sugar industry is well placed to accept new growers as the mills are able to accommodate additional cane. Contractors are available to support growers with land preparation, planting, harvesting and transport to the mill; and price per ton is guaranteed with no marketing being required. This presents a unique opportunity for new growers in the industry to become successful and remain so into the future.



Challenges Facing Small-Scale Grower Projects

While the agronomic, scientific and technological aspects of sugarcane production remain relevant and critical to success at any scale of production, a modified extension approach is now recognised as being necessary to ensure small-scale grower projects succeed. Small-scale grower/community based projects face cultural, social and environmental scenarios very different to that of the commercial grower, so much so that it often appears first and third world economies exist side-by-side. An outline of the situation facing extension staff and development agencies working in these areas is discussed below.

The Agricultural Extension Officer (AEO) attempting to introduce sugarcane as a crop choice in a new area is faced with a set of challenges completely unique to small-scale growers, and he/she is often unprepared to cope with these because of lack of training, personal experience or familiarity. These challenges include cultural barriers, lack of transport, skills, finances, credibility and trust in the development Agency.

Culture

Local conditions and cultures within communities need to be understood and accepted in order to introduce change in the communal mind-set and stimulate appropriate land use, as well as for communities to recognise and accept the opportunities presented to them. Often communities are suspicious of proposals made due to previous failures to deliver or unsubstantiated promises being made. In addition, agriculture as a career or income-generating activity is perceived to be a poor choice - probably due to past project failures, a lack of infrastructural and technical support or lack of financing for small-scale growers. Land tenure structures often result in a lack of control and decision-making with regards to individual plots of land. Other factors such as patriarchal societies, urban sprawl and a lack of land ownership restrict investment in land improvement and development. A lack of fences and livestock-control hampers crop production. The sugarcane crop is often poorly understood and entering a new market is perceived to be beyond the scope of individuals who are generally resource poor with limited or no access to information and support networks. Many of the individuals are elderly and/or have no collateral with which to “bargain” for an enabling environment. Communities often lack the resources to acquire inputs and lack access to finance. In addition, they have no knowledge of who to approach or how to request assistance to get started. This is where extension staff, armed with a unique and repeatable methodology, are needed to assist and support these communities.



Access to Transport and Equipment

Many rural communities lack access to equipment and therefore have to rely entirely on contractors. Many areas have often poor or no contracting services available to assist with land preparation, harvesting and transport. The communities are often unskilled in assessing the quality of services rendered. Access roads and road networks are often poor; plots are scattered and small, restricting the size of contracting equipment able to service these areas. Payment for services and inputs is a problem due to a lack of money or access to finance. Individuals are often misled or taken advantage of in terms of the cost of services since they, in many instances, have no choice of contracting services i.e. only one service provider in the area creates a monopoly. Access to, as well as the cost and delivery of, seedcane is a major challenge, since small amounts are required over several weeks by many individuals. They in turn may have to re-distribute seedcane to scattered plots and have no labour to plant large amounts of seedcane before it degrades. The lack of locally produced seedcane has led to many failures in small-scale projects due to growers not planting new varieties, not replanting old fields, incorrect application of fertilisers and other management activities.



Knowledge of Natural Resources

In most instances, no natural resource assessments have been conducted in these communal areas which could assist in developing land use plans to highlight enterprise opportunities and resource potential. A lack of understanding of the natural resource base, ecosystem function and management results in a lack of appreciation of the potential income which can be achieved from those resources. Land degradation is an on-going process negatively affecting development over vast tracts of communally-owned land.

Business Skills

The transfer of business skills to small-scale growers is very important for the long term success and sustainability of projects. Most small-scale growers have little experience in calculating input costs, contractor's fees, or the achievable income from their crop. In addition, the financial discipline of setting aside monies to cover input and maintenance requirements for the following crop cycle is absent since most homesteads live close to the breadline and do not have access or the opportunity to accumulate surplus funds to be utilised in this manner. Business skills are critical to recognising the link between the soil potential and its production value and the potential of that land to provide a significant income i.e. the value of the land, if sustainably managed, to provide a better livelihood. Business skills are important to assist with making informed decisions as well as understanding all the factors that play a role in achieving good production and minimise the risk



of crop failure e.g. insufficient or incorrect fertilisation, poor weed control etc., which are often neglected by small -scale growers. The AEO must create awareness of the value of “doing things right” such as paying for soil analyses or pest and disease inspections, which the growers may not view as having a direct benefit initially.

The most appropriate time to introduce business skills is at the Soil Form Identification and Land Potential field day. It is on this day that the soil form is described and suitable varieties are discussed. The yield potential is obtained from crop models in the Bio-resource Programme and adjusted for local climate factors. A determination, at current mill price per ton, of the potential financial income can be linked to the inherent production value of the land. The business skills field day will include a basic income and expenditure calculation, including contractors, fertiliser, herbicide, planting and other costs, offset against the value of increased yields, through improved management, and area under sugarcane, to show the potential net income to the grower.

The business skills day must include financial planning for the purchasing of inputs for following ratoon crops and to enable the growers to become independent and not dependant on external financial help. This is very important since the financial assistance will cease after the two seed-cane-producing crops. Once a new demonstration plot is found, the original grower reverts to being a commercial sugarcane grower and the financial assistance is taken away to assist the next seedcane merchant. The training tools for this field day have been developed and serve as an example of the aspects covered during the training day (see Appendix 9 & 10).

Financial management is very important as finance is always a limiting factor and good financial management results in sustainability and increased crop production. Good business skills determine the management of profit and cash flow critical for long term growth and success.

It is important that the Agricultural Extension Officer reiterates basic business skills at every opportunity throughout the life of the project and that the grower keeps good records of expenses and other costs as they arise, since this will assist in planning accurately for the year ahead. This will reinforce the message that good agronomy and good business go hand in hand, and allows the grower to assume control over his/her crop as a valuable investment and an opportunity to improve his/her livelihood.



Credibility and Accountability

The credibility of extension staff is often questioned by growers, particularly if they are new to an area and unknown to the community. Local communities are often suspicious of new ideas, empty promises and the risk of changing from activities that they are familiar with, to a new commodity. Each of the role-players for a new project must have a clear mandate which must be adhered to throughout the project. If any one of the role-players leaves the project, this could result in the project failing. All role-players must thus be held accountable. Each grower must also agree to follow the steps outlined for the project and not deviate (e.g. burning cane early etc.).



Financial Resources

Many small-scale grower projects have failed due to the lack of access to financial resources (for various reasons). In some instances, where finance was available and used for the project, the project still failed as a result of:

- the project being placed on the incorrect resource base,
- no buy-in from the community,
- the role-players not being on board from inception of the project,
- the community not having the resources or technical training to sustain the project once the initial start-up phase was complete.

Successful implementation should not depend on the availability of funds as the main issue, since it is only start-up finance which is critical. If the project is implemented on a suitable natural resource base, and other management factors are properly adhered to, financial returns will follow. It is important that the emphasis is placed on knowledge transfer (science and its application) rather than money. If the methodology outlined in the following chapters is followed, monetary success will follow. Once growers recognise the opportunity, they are often willing to commit time, labour and numerous other inputs to ensure the project gets started and is maintained. It is the sense of ownership that results in true sustainability of a project.



Extension Specialists

SASRI Small-Scale Grower Extension Specialists operate through the government structures in the provinces where sugarcane is grown, namely: Eastern Cape, KwaZulu-Natal



and Mpumalanga, and operate according to mill supply boundaries. DAEA regional staff are linked to municipal boundaries. Extension officers must be equipped and enabled to perform all tasks listed in the Programme of Work/work plan. This must include the resources and institutional support they may require to undertake these tasks. (A list of basic equipment for ESs can be found in the Appendices).

Farm Size

Growers can be afforded the opportunity to enter the sugar industry and /or increase the area under sugarcane by the DAEA (as development agent) through the funding of seed-cane demonstration plot projects. This support, alongside that of the millers and scientific input from SASRI, will enable the growers - through a constant flow of technology - to improve their yields and income as well as provide the added benefit of reducing risk. These farms need to be environmentally and economically sustainable. The Traditional Authority (TA) needs to be made aware of the value of sugarcane development opportunities in the form of income and employment in their areas so that they too, will continue to support the enterprise. The initial farm size may be one hectare, although the optimum is two per demonstration plot as this will allow for comparative plots, and be more economically viable. In many instances, the farm size is restricted by land allocation from the TA. Expansion is dependent on the release of vacant land or leasing from adjacent neighbours. Priority needs to be given to business skills training of growers which can emphasise the greater viability of expanding the area under sugarcane (economies of scale). This also relates to the viability of supplying contracting services which need a minimum area to plant, harvest and transport. Prior to implementing a project in an area, the economic size of a contracted harvesting operation has to be determined. Growers need to form groups and have contractors tender for harvesting contracts.



Growers need to form groups and have contractors tender for harvesting contracts.

General

- All Small-Scale Growers need business skills training.
- The ES needs to be involved in the recruitment of new AEOs to assist with the recruitment of suitably qualified, committed and skilled extension staff.
- The reporting structure for the AEOs needs to be formalised and made known to all role-players.
- Extension is a process and can only be evaluated successfully over a number of years.

These (and many other) reasons have limited the adoption and success of small-scale grower projects in the past. It is clear that the level of support needed by communities consistently increases and the extension approach needed should differ from that offered to commercial growers in order to overcome perceived and real challenges.



PRELIMINARY PLANNING PRIOR TO IMPLEMENTATION OF A SMALL-SCALE GROWER PROJECT

2.1: Identify and Involve All Role-Players

Small-scale grower projects are often initiated by the local Extension Officer, after having been approached by a community for assistance in starting a sugar project in their area, or he/she may have recognised that such a project could be successful in a given area and thus initiates or suggests the idea to a community. The Extension Officer's first step must be to consult and establish links between the various role-players required to support the project. Without this support, the project cannot succeed. Key contact numbers and email addresses can be obtained from the local extension office/officer (some can be found below). A list of important stakeholders includes, but is not limited to, the following:

- **Millers:** As the paypoint in the area, the local mill forms the point of entry for establishing a new area thus they will maintain a detailed and accurate database of all cane suppliers in the area. Community leaders and grower groups must form part of Mill Cane Committees. The mill will have resources, finance and staff to support the project. The mill will issue a quota number to each grower and will require each grower to have a valid bank account. The mill will then accept and make payment for cane and keep records of cane supply for each grower.
- **SASRI:** Offers support by conducting relevant and appropriate research, transferring new technologies and research results (via the extension services and scientists), as well as provide analytical services for the growers.
- **Growers:** Commercial growers can offer mentorship and assistance with management issues, and are the initial source of seedcane. Small-scale growers are the site of expansion within the industry and can also supply labour. The small-scale growers require income, technology and resources as well as mentorship and guidance in order to become successful growers. The small-scale growers can operate as a group (such as a co-operative) or as individuals, who must have a valid bank account to which payment will later be made by the mill.
- **Pest, Disease and Variety Control Committees and their officers:** Ensures that seedcane is disease-free. They will also control the seedcane varieties planted (pre-selected per area), undertake disease identification and general control for the duration of the project. Growers will have to pay for these services. Therefore the value of these services to the grower must be clearly demonstrated during technology transfer events. This is critical to prevent small-scale growers becoming a future source of disease spread in an area.
- **KZN Department of Agriculture and Environmental Affairs (DAEA):** This Provincial Government





Department will support the development of sugarcane if it is viable in the extension area. As the development Agent, they should supply resources such as extension officers, research and technology support, analytical services including land assessment, financing and equipment.

- Local and International NGOs, foreign donors and companies: These bodies may also wish to become involved in specific projects by offering financial or other support.
- Co-operatives: Resources such as fertiliser, herbicides, equipment and implements can be obtained through a co-operative which can negotiate better costs. It is important for suppliers to address the needs of small-scale growers in terms of smaller volumes, appropriate packaging and prices. They also need to be informed of small-scale grower projects in their area of operation.
- SA Cane Growers' Association: Assists with obtaining finance, establishing project proposals, business plans and other financial aspects of the projects. Growers will have to become members of the Association.
- Agricultural chemical and fertiliser representatives: Provide technical knowledge, inputs and specialist advice.
- Local municipalities: Have a responsibility with regards the supply of infrastructure, roads, electricity and water (critical for access and further development of the area). The natural resources, once evaluated in terms of potential for various land uses, should be mapped and form part of all integrated planning documents such that areas of high agricultural potential are protected from non-agricultural development e.g. golf courses, industry, mining and residential estates.
- Other government departments: To support the projects as well as to ensure legislative compliance e.g. Local Government and Traditional Affairs.


Contact Numbers

South African Sugarcane Research Institute

 031 – 508 7400


 www.sugar.org.za/sasri

South African Sugar Association

 031 – 508 7000


 www.sugar.org.za


KZN Department of Agriculture & Environmental Affairs

 033 – 355 9100


 www.kzndae.gov.za

SA Cane Growers' Association

 031 – 508 7200

 www.sacanegrowers.co.za

P & D Officers and Variety Control Committee

 Biorisk contact number: 060 544 5393



2.2: Establish the Natural Resources Potential of the Proposed Project Area

The Extension Specialist must undertake a preliminary land resource assessment to get an indication of whether a project should even be considered in the area. This will be in the form of a reconnaissance survey and will include the following broad aspects:

- Use the computer-based Bio-resource Programme from the Natural Resources Sub-Directorate (DAEA) to obtain broad natural resource information, including long-term yield potential, to estimate production facilitating the calculation of the economic viability of the opportunity presented for growers and the mill.
- Terrain and slope – Information must be gathered on aspects of soil conservation and runoff control, ease of mechanisation and extraction routes, as well as compliance with legislation.
- Soils – reconnaissance soil survey must be conducted to ascertain general depth, clay percentage, water-holding capacity related to yield prediction and thus the opportunity for income and growth.
- Area – ascertain whether there is sufficient and suitable land available to ensure the success of a project and project expansion, distance to the mill (viability of the project), impact on other land uses, community response to the proposal.
- Climate – Explore suitability for production, constraints on varieties (frost), rainfall effects on yields, disease opportunity; need for irrigation.
- Establish the number of growers in the area that can realistically be sustained by the project.

This information must be compiled as a preliminary report to be presented to the role-players to promote the suitability of the area for a project, and to obtain support for the proposal.

Natural resources data can be obtained from the Bioresource Programme (BRP) developed by the Natural Resources Sub-Directorate of the DAEA;

Contact number 033 355 9505/355 9100 or hoskinss@kzndae.gov.za or on the website <http://www.kzndae.gov.za>.



2.3: Acquire Finance for the Project

Historically, small-scale growers have experienced a lack of collateral since they have no ownership of land and few capital resources to offer as surety against loans. In addition, there is usually little business acumen or understanding of business planning with regards to sugarcane production within these communities. For these reasons, all small-scale grower projects require significant investment and financial management guidance by government and/or other institutions to ensure they can be implemented and supported.

- Depending on the size of the project, the financing may come from the mill, government departments, banks, foreign donors, municipalities or other non-governmental organisations. The role-players (Phase 1) have a major responsibility here and can provide contacts to access finance.
- It is up to the local agricultural extension officer to identify funding options and secure such funding for the project by engaging with the role-players.
- The AEO must support this funding request by the provision of a business plan (linked to the preliminary natural resource report – Phase 2) which will show that the financing is well placed and that the project has a good chance of succeeding.
- Finance is required for inputs such as land preparation, seedcane, weedicide, fertiliser, labour and equipment. Once these start-up inputs have been procured, the project can be initiated and follow-up finance will have to be ensured and linked to each of the future developments of the project. These links should form part of the business plan, as each phase will require different inputs and funding.



IMPLEMENTATION METHODOLOGY

**New Demonstration Plot
(Plant Crop)**



IMPLEMENTATION OF A SMALL-SCALE SUGAR-CANE PROJECT USING THE DEMONSTRATION PLOT METHODOLOGY

Once the preliminary planning is complete, the area for the project has been ascertained as being suitable, finance has been acquired and the relevant role-players are in place, the actual implementation of the project begins. This is the most critical step to the success of small-scale grower projects since this is the proof that ‘it can be done’.

The methodology described utilises a two-hectare demonstration plot as the launch pad for the project. The demonstration plot methodology has a ‘triple bounce’ outcome in that it (i) serves as a source of locally produced seedcane through the development of seedcane merchants while also ‘proving’ that sugarcane is a viable crop and a secure source of income in the area; (ii) provides the ideal opportunity for technology transfer and skills development for small-scale growers, and (iii) forms the basis for enhancing the credibility and effectiveness of the extension officer/services to the community. The demonstration plot is an example of service delivery in action and must be used as a ‘living classroom’ at which agronomic, scientific and economic opportunities are demonstrated in the field. It has been proven, during evaluations and interactive surveys to assess knowledge gaps in collaboration with Reunion Island extensionists, that messages which are showcased in the field have a far greater chance of adoption than lectures in boardrooms (Gillespie *et al.*, 2009b). Farmers want to see new ideas and technologies working successfully in their area under local conditions before considering adopting them.

Once a community requests assistance to initiate a project for the planting of sugarcane, or the local extension officer recognises an opportunity for a project, the local extension officer becomes the link between the miller (payer) and the grower (payee). What follows are clear steps to both initiate as well as ensure the sustainability of new sugarcane growers.

The steps to implement small-scale grower projects, as well as the activities to be undertaken by the Agricultural Extension Officer/s throughout the project, are detailed in 27 steps. They are:

Step 1: Consult Role-Players

The local AEO must consult with the community leadership TA (Traditional Authority), local Mill Cane Committee, and relevant role-players to identify possible co-operators who will take ownership of the demonstration plot and on whose land the demonstration plot will be planted. This plot will become the initial seedcane nursery for the community. The AEO must also establish links between role-players who will



support the demonstration plot. **A demonstration plot will initiate future development in the area and the community, and is the most valuable asset in the AEO's programme of work**, requiring undivided support and phased action. It has been noted that, if the demonstration plot (and the subsequent provision of seedcane within the community) is successful, the project will take off.

Responsibility: AEO

Step 2: Financing for the Project

The AEO must acquire finance for the demonstration plot. This type of project will usually not be funded by commercial banks since there is no collateral and, on initiation, there is no established product. Financing will have to be sourced from the local mill, the emerging growers themselves, as individuals or a co-operative, government departments or other interested parties. A project proposal or **business plan** must be developed by the AEO, with assistance from the SA Cane Growers Association, where budget allocations are detailed. This business plan will indicate the suitability and potential of the area to produce sugarcane at yield levels that are economically viable, and which will afford new growers an opportunity to have financial security and an improved livelihood. This plan will also reassure investors that the project has a good chance of success. It must be clearly stated in the agreement between the funding agent and the co-operator, whether funding is available for the plant crop only or for the entire production period of seedcane (plant plus first ratoon), after which the costs must be borne entirely by the co-operator i.e. it has now become commercial sugarcane and the co-operator has become an independent commercial grower.

Responsibility: AEO

Step 3: Selection of Individual Co-operators

The co-operator must be selected from the identified area. He/she could be a successful grower already (since this is a business in which he/she will invest), or an individual who has access to suitable land. He/she now becomes a seedcane merchant for the plant and first ratoon crop, after which he/she reverts to being a commercial cane grower. The co-operator will have to sign an agreement to comply with all conditions attached to the management of the demonstration plot. The co-operator must be an agreeable, co-operative and willing individual since his/her plot will have many visitors during field training days as well as by scientists, development agents, NGOs and other interested parties during the course of the project. (An example of an Agreement can be found in Appendix 1).

Responsibility: AEO and community leadership



Step 4: Site Selection for the Demonstration Plot

- The site must (as far as possible) comprise of one soil form for the area of the plot and be representative of the dominant soil type for the greater area of the community. This ensures that results are relevant to the greater area.
- The site must be accessible to vehicles to allow for the supply of inputs and extraction of seedcane, and to allow access for visitors and trainees on information days.



- The field chosen must be volunteer-free if previously planted to cane.
- The site must be a minimum of two hectares in size and adequately fenced.
- The plot must be fairly uniform in slope (to enable visual comparison between plots and varieties) and must comply with all legislative mandates i.e. the site should not be divided by or infringe on natural watercourses, indigenous forests and other natural resources with environmental significance, wetlands, cultural sites, graves or houses.
- If the plot is in an area in which irrigation is required, the AEO must approach the relevant specialists and support agencies in terms of water rights, equipment, design and training for the growers in question.

Responsibility: AEO

Step 5: Establish a Programme of Work and Field Training Days

The extension officers must have the relevant skills and qualifications required by the post, the duties of which can be outlined in a detailed job description (Appendix 2). **The AEO must establish a Programme of Work (PoW) with his/her supervisor for the year (Appendix 3, part of which is a dedicated PoW pertaining to the demonstration plot(s) namely the Annual Implementation Plan, Training and Mentorship Programme (Appendix 4)).** The demonstration plot PoW will revolve around the acquisition of seedcane for the demonstration plot, the growing and future supply of seedcane from the plot to other members of the community as well as the expansion of sugarcane agriculture throughout his/her region. This PoW informs the AEO, his/her supervisor and the role-players of the work to be undertaken throughout the year and offers an opportunity for monitoring and evaluation of the official. It also monitors and evaluates the impact of extension services in the area as well as the economic value of the project within the community and to the industry as a whole.

Responsibility: AEO, his/her supervisor, the growers and relevant role-players

The PoW (Appendix 3) informs the Annual Implementation Plan: Training and Mentorship Programme which is a global view of the activities which should take place throughout the year and must include field days at which technology transfer will take place between various role-players and the new growers. Field days must be organised around each step of the development of the plot and be held at the plot. The demonstration plot will now become the 'classroom' to showcase the potential for cane as a crop, the value of the natural resource base, the agronomic responsibilities of the grower, comparison of varieties, value of PD&VCC and the financial benefit to the grower and the industry. The field day topics must be simple, clear and easily understood, supported by visual aids and leaflets, transferred at the appropriate level and, where possible, in the local language. Scientific aspects of sugarcane production can be addressed to facilitate the transfer of knowledge and understanding of all aspects of the production system and can be given by the relevant invited researchers in each field e.g. soil scientists, entomologists, chemical representatives etc.

The cost of these field days (catering, fliers etc.) can be covered by any of the role-players willing to do so. This must be organised in good time ahead of each field day by the AEO. A list of the important field training days linked to the demonstration plot PoW is supplied in Appendix 5.

At this time, the Agricultural Extension Officer (AEO) and the grower will discuss further site management including follow up weed control (a light hoeing may be required) and firebreaks. The firebreaks must be prepared in May at the start of the fire season and should be at least five metres wide. These management activities are also specified in the signed Agreement (Appendix 1).

Responsibility: AEO



Step 6: Land Assessment and Soil Identification

A detailed land assessment (farm plan) must be carried out on the demonstration plot site to ensure compliance with legislation and to plan activities associated with best management practices. The land assessment must include:

- measurement of slope to ascertain whether contours are necessary,
- assessment of the access and extraction routes,
- measurement of the available area in hectares and establishment of the best alignment and/or placement of the plot for demonstration purposes and best practices,
- occurrence of alien plants; if present they will need to be removed and subsequently controlled,
- determination as to whether the site is virgin land or previously cultivated (a permit to break land is required for any land not previously cultivated, or that has not been ploughed in the previous ten years - Conservation of Agricultural Resources Act No. 43 of 1983),
- soil conservation requirements must be planned (watercourses, trashing, contour ploughing, runoff control etc. - Conservation of Agricultural Resources Act No. 43 of 1983; National Environment Management Act No. 107 of 1998);
- available infrastructure and facilities for field days and visitors.

The site, once demarcated, must be geo-referenced and the corners of the plot recorded by GPS to produce a site map.

Responsibility: AEO

A soil pit must be prepared which is at least 1 m x 1 m in size with a sloping or stepped side to facilitate access and which is a minimum of 1 m deep. The soil pit will enable assessment of the soils on site having sufficient unrestricted rooting depth for the proposed crop. The pit must be sited more or less centrally in the plot and will be utilised to identify soil form and family, soil depth, texture and other important edaphic properties for production. The pit will be re-opened on the relevant field day so as to describe and demonstrate the importance of soil type for



production and other decisions such as variety selection, herbicide concentrations, water-holding capacity etc. which are related to soil form. The pit must be closed soon after the field day for safety reasons since it may pose a threat to animals and small children. This soil information is critical to decisions which must be made such as requirements for the type and timing of land preparation, conservation works, varieties, weedicides, liming, fertility and the yield potential of the plot.

Responsibility: AEO

A Soil Potential and Business Skills Field Day must be organised at which the above decisions regarding planning will be explained and elaborated on. The soil pit must be opened for the field day so that the growers can be taken through the description of the soil profile and its properties and to grant the co-operator a chance to get into the soil pit and appreciate the texture, structure and depth of his/her soil. A photograph of the soil form should be included for record purposes. From the soil profile, the production potential of the area is explained in an uncomplicated message in local language (if possible) and presented at the relevant level. The soil potential is related back to the potential yield of different varieties, fertility, water availability and the income opportunity this soil form presents to the grower. This site information must be collected on a form (Appendix 6). These forms must be filed for record purposes, and a copy must be supplied to the co-operator, SASRI and DAEA Natural Resources.



Photographs are a useful tool for generating a pictorial record. Examples are shown in Appendix 7 and 8. In addition, soil samples for fertiliser recommendations must be collected and sent to the laboratory for analysis. The correct methodology for taking a composite soil sample must be demonstrated on site for fertility analysis. The Fertiliser Advisory Service (FAS) Submission form must be completed accurately with the co-operator/s, for submission to the SASRI laboratories for soil fertility recommendations. An accurate obtainable yield of each site must be carefully estimated and filled in on the form to achieve a precise recommendation and to avoid under- or over-fertilisation, fertiliser represents a significant input cost for the project (and later to the growers themselves).

Introductory business skills are transferred at this field day. The potential yields of the site are estimated from crop yield models of the Bio-resource Programme and commercial farmers in close proximity to the site. Simple calculations of potential income and basic input costs are described on a whiteboard or flip chart on site. The AEO must develop a basic system of accounting for the grower, to assist him/her to account and budget for the following plant and/or ratoon crop. This becomes the business element of the demonstration plot project and delivers the message of what can be earned from a crop. The accounting system must be included in the data sheet and must be kept from the inception of the project. The income projections will be the driver for the project as well as the catalyst for further development of the project in the area. The monetary value of what could be realised from sugarcane as opposed to high potential land lying fallow can be clearly indicated, as well as the opportunities that agriculture presents to communities.

An outline of this calculation is shown in Appendix 9 for plant crop and Appendix 10 for ratoon crop.

Responsibility: AEO



Step 7: Source Seedcane with PD&VCC

The AEO must notify the PD&VCC officers of his/her need to identify a source of seedcane for which he/she has already secured finance. It is important to note that all demonstration plots should be planted using double stick to ensure an even stand and uniform germination (tons of seedcane required will be dependent on the variety to be planted e.g. N12 requires 12 tons/ha while N48 requires 16tons/ha).

Responsibility: AEO

Step 8: Confirm Source with Local PD&VCC and Acquire Seedcane

With the co-operation of the PD&VCC officers, the acquisition of seedcane must be confirmed well in advance of the dates set for land preparation, to ensure that it is available, paid for, disease-free and that the correct varieties have been pre-selected for the plot. The transport arrangements must also be in place for the date of planting to allow contractors to plan ahead (i.e. routes, type of transport vehicle, accessibility and travel time).

To ensure good germination there must be minimal delay between seedcane harvest and planting, therefore the date of harvesting the seedcane must be closely aligned to the date of planting. The chosen varieties must be kept in separate stacks at the demonstration plot so that each variety can be planted separately on the demarcated areas of the plot. This is to allow for differences in growth habit and yield to be observed and quantified at future field days. It also provides an opportunity to assess and compare the best and limiting features of the various varieties suited to the greater area.

Responsibility: PD&VCC and AEO



Step 9: Soil Conservation Planning

A **Soil Conservation Planning Field day** (Appendix 11) must be scheduled where the site is planned in terms of the soil conservation requirements. This will include a plan for the land preparation day and cover aspects of the value of soil preservation, microbial function in soil, the control of runoff and avoiding soil erosion. The benefits of trashing, preserving organic matter, improving infiltration etc. can be demonstrated by the use of mini runoff plots, posters etc. The essential message is that conservation of soil is critical to good production for generations to come and ensures the land use is both sustainable and benefits the grower economically. The main topics to be covered are listed in Appendix 11 as well as the equipment required for the field day.

Responsibility: AEO



Step 10: Soil Fertility Information

A **Soil Sampling Results Field Day** must be held to discuss and explain the Fertiliser Advisory Service (FAS) printout for the site, which can be distributed to attendees. The FAS results and recommendations must be clarified and the importance of correct fertilisation of the crop must be stressed. The fertiliser options must be explained and the balancing of nutritional requirements of the crop described. Timing and application of fertilisers should also be described. The practical application of fertilisers can be re-visited. Problems that can arise from over- and under-fertilisation must be discussed since fertiliser determines the health of the crop as well as a significant input cost to the grower. The direct link between fertility and yield must be stressed. An example of an FAS results sheet can be found in Appendix 12.

Responsibility: AEO

Step 11: Volunteer Removal

The AEO must ensure the co-operator understands the importance of having a 'clean' field on which the demonstration plot will be established. The eradication and removal of volunteers must be demonstrated. If the area was previously planted with sugarcane, all volunteers must be completely eradicated by hand-hoeing or be chemically killed, removed from the field and composted. This will ensure no carryover of pests and diseases and the removal of off-type varieties on the newly established demonstration plot. This is critical since the plot will be growing seedcane. Ensuring that the grower undertakes and understands the importance of a clean field is part of the skills transfer to the new grower.

Responsibility: AEO

Step 12: Fencing of Demonstration Plot

The demonstration plot must be fenced to protect the crop from being grazed and trampled by animals. It also prevents theft of sugarcane. The cost of the fencing can be borne by the project or the co-operator.

Responsibility: AEO

Step 13: Seedcane Inspection

The AEO, PD & VCC officers must visit the seedcane merchant to verify the quality and quantity of the seedcane. The harvesting date, financial and transport arrangements are confirmed at this time.

Responsibility: PD & VCC and AEO



Step 14: Land Preparation Planning Arrangements

The AEO must identify what is required on the plot in terms of plot layout, site clearing, lime spreading, ploughing, discing, ridging or minimum tillage practices. He/she must approach the Mill Cane Committee for a list of contractors who offer services in the area. This list will comprise contractors who are familiar with the conditions and services required for sugarcane. The demonstration plot must be marked out in blocks in which separate varieties can be planted. The



blocks must be separated by a break of 3 metres, lines must run across the slope and the varieties must follow each other in numerical order from left to right for ease of reference at future field days (e.g. N12, N37, N48). In some instances, it is not possible to have completely uniform soils throughout the plot and soil depth will most often change down a slope in response to drainage, rather than across a slope. This layout ensures that when the demonstration plot is viewed from the bottom edge, the varieties will be easily compared for differences in height and growth patterns when viewed across the slope (Figure 1). The demonstration plot can also be used to compare minimum tillage with conventional tillage practices, and this must be planned for to allow for the appropriate land preparation to be effected and plot layout to be considered. Growers must be encouraged to utilise conservation tillage practices to promote long-term soil health, particularly in the light of climate change, carbon sequestration demands, sustainable agriculture and the narrowing profit margin. Green manuring and organic manures can be considered as fertility options, while integrated farming practices are popular to supply household food security. These are all topics which can be included in field day presentations.

Responsibility: AEO

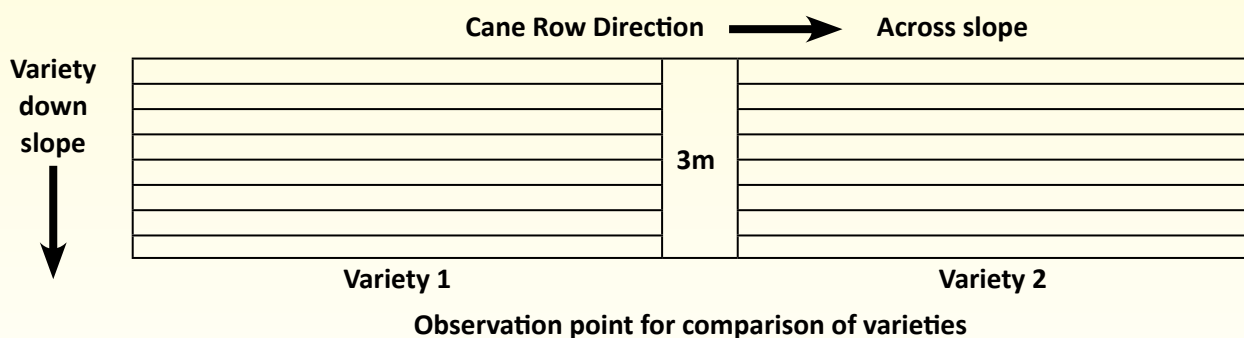


Figure 1: The most suitable layout of demonstration plots for future observation of varietal differences.



Step 15: Establish the Availability of Herbicide Application Equipment

The AEO must ascertain what equipment is available within the community for the application of herbicides prior to land preparation, e.g. knapsack and measuring containers. If the field has become overgrown with weeds or grass, these will need to be killed before ploughing. If no equipment is available, he/she must source the equipment before planting.

Responsibility: AEO

Step 16: Weedicide Application

At this stage of planning, that the AEO may choose to hold a **Weedicide Application day** for pre-emergent herbicides at the plot, if required. At this event, knapsack calibration, weedicide application and maintenance of equipment must be demonstrated. If this is not required at this stage, this field day must be held later for post-emergent weedicides. After planting, an initial application of weedicide must be applied and the negative effect of weeds on yield must be explained to growers. Continuous assessments of weed growth must be undertaken regularly, until the crop canopies and further weed growth is inhibited. Appendix 13 lists an example of the equipment required and an outline of a typical field day.



The AEO must ensure that weedicide is acquired from project funding. He/she must ensure that the weedicide is applied at the correct rate and conditions (weather, crop stage, weed spectrum etc.) (Refer to SASRI Herbicide Guide).

Responsibility: AEO

Step 17: Lime Application

Many of the soils in the SA sugarbelt are acidic in nature. The effect of soil acidity on crop yields should be explained as well as the importance of correcting soil pH prior to planting. Lime is inexpensive to purchase but does incur transport and application costs. It must be applied uniformly across the field at least six weeks prior to planting. If soil acidity is not corrected, the effects of low pH will significantly reduce yield, make fertiliser absorption less efficient, and stunt root growth for the plant and all future ratoon crops. The economic cost of this



omission over the next ten or more years should be quantified to the grower. If the FAS results indicate that soil acidity levels are so low that it will compromise sugarcane yields, the recommendation will stipulate the type and rate of lime required to correct the soil pH. The AEO must acquire the recommended lime (using project funding), organise transport, delivery and the application (uniform spreading) of the lime on site. If lime is required, it must be applied prior to planting activities to allow sufficient time for the pH to be moderated before germination. The co-operator must be informed and involved in all these activities for future reference.

Responsibility: AEO

Step 18: Acquire Inputs and Planting Equipment

The AEO must ensure that all inputs required for planting are acquired and delivered on site. This includes delivery of seedcane (bearing in mind that the different varieties must be kept in separate piles on delivery), weedicide and fertiliser to the site. The timing of this step is critical to the success of the project since any omission at this point could result in failure of the project.

The co-operator must ensure that there is labour on site. The AEO and co-operator must check before the planting date that other essential equipment is available such as, cane knives, hoes, disinfectant for cane knives (e.g. carbolic acid), pegs and string (minimum 50 metre length), marker boards for variety identification, a clean water source and bags for fertiliser spreading.

Responsibility: AEO and co-operator

Step 19: Land Preparation

It is preferable to hold a **Land Preparation Field day** on a newly developed site. If the site is already under sugarcane, this can be combined with the Planting Field Day or with the Soil Conservation Field Day. This field day is useful on a plot on which contours are required, as it is important for growers to understand why contours are needed, how they capture runoff and how they should be maintained. The safe disposal of excess runoff into a grassed waterway can also be discussed, with the view to avoiding soil erosion. This helps to develop a greater understanding of resource protection and management.

The AEO must arrange for the contractor to undertake ploughing, disc harrowing once or twice (depending on soil type) and ridging. Any other conservation structures required in terms of the conservation plan outlined in Step 9 (e.g. contours, runoff control, waterways, roads etc.) must be effected at this time.



Responsibility: AEO

Step 20: Planting

The AEO will begin by marking out the plots using string and pegs with each plot size relating to the amount of each variety purchased. The labour must then be organised and briefed on which variety to plant where, such that each variety is planted in a block (not replicated plots, since this is not an empirical study but is simply to be used for observation/demonstration). The cane must be planted at the correct depth using the double stick method



to ensure good germination. It is preferable to plant one variety at a time to ensure no mixing of seedcane takes place. Cane knives used to cut the setts must be continuously disinfected during cutting to prevent disease. Simultaneously, the soil sample results will indicate the type and quantities of fertiliser required and the recommended options for purchase. Often, the nutrient requirement cannot be met by one complete fertiliser, and may need topping up with a straight fertiliser or a mix of several. This needs to be explained to the growers and the economic cost of incorrect fertilisation explained. The application of fertiliser in the furrow at planting will be explained and undertaken. A third operation will be to close the furrows using hoes. Once planting is complete, marker boards are placed demarcating the plots of differing varieties. It is useful to photographically document each stage of planting during the operation.



The Planting Field day (Appendix 14) is very important since it is at this day that the attendees including the co-operator, will learn the practical skills of hand fertiliser application, fertiliser selection according to the soil sample laboratory results, depth of planting of the sett, cutting setts, sterilisation of the cane knife for disease control and covering of the seedcane by hand hoe. Varieties will be planted separately and the differences between the variety stalks can be shown prior to placement in the furrow. Later, germination rate, stalk population and time to full canopy can also be demonstrated for each variety planted.

Responsibility: AEO and co-operator

Step 21: Weedicide Application

A Weedicide Application field day (Appendix 13) is critical and is primarily held to explain the use of pre- and post-emergent herbicides and the negative effect of weeds on production. The AEO must explain the essential equipment required, particularly a knapsack sprayer. Application of herbicides is encouraged in preference to hand weeding since it is more cost effective, less labour intensive and more beneficial in terms of soil health and conservation. The calibration of a knapsack sprayer and selection of chemicals should also be explained. Each of the growers present must be encouraged to spray a section of the field to ensure they understand and can practically undertake this step. The knapsack sprayer and the chemicals required can be purchased by the group of growers as a whole so costs are reduced due to bulk-buying; smaller packages generally cost more per unit. It is useful to invite the chemical representatives from the local companies to attend and possibly present a topic at this field day. The relatively low cost of purchasing a knapsack sprayer per grower can be compared to the cost of reduced income due to weed pressure if the grower has to wait weeks for his/her turn (see the SASRI/DAEA Ratoon Production Module).



Responsibility: AEO



Step 22: Topdressing Fertiliser

A **Fertiliser Topdressing field day** (Appendix 15) must be held where the soil sample results will again be discussed to assess the follow-up fertiliser requirements for topdressing. At this day, the fertiliser options, cost and manner of application will be demonstrated. The growers must apply the fertiliser at the correct rate. Costs for buying, transport and applying the fertiliser are also discussed. It is critical to emphasise the importance of not under-supplying nutrients as a way of reducing input costs. It is important that the AEO should be aware of the differences in fertiliser efficiency according to Midlands, Coastal Hinterland and Coastal sugar areas.

Responsibility: AEO



Step 23: Variety Introduction and Pest and Diseases

Three months after planting, this field day (Appendix 16; 17; 18) should be held as it will allow growers to see differences between the growth and habit of the planted varieties. A presentation on the varieties planted at the plot should be given and structural differences must be demonstrated using examples. Further presentations on the various diseases and pests that affect sugarcane in the specific area must also be given.

A line-by-line inspection must be conducted by the PD&VCC officers, AEO and the growers in groups. This inspection allows for the identification of off-type plants, differences in growth habit and leaf colour. Stick population and thickness between varieties can be explained in the presentation and examples from mature fields could be brought to the field day (since no stick will be available from the young field yet). In addition, the inspection will also allow for diseases to be identified by examining the leaves within each row. Evidence of disease can then be shown to the growers and, if it exists, the infected plants identified and removed to prevent spread of disease. Invited entomologists and/or the PD&VCC officers can undertake a sweep of the field, identify any insects they come across and explain whether they are beneficial or detrimental to cane production. It is important to make growers understand that not all insects are necessarily damaging, and a balanced ecology on the site is necessary to maintain soil and crop health. Ratoon stunting disease (RSD) samples must be taken by the PD&VCC officers.

The growers must be taught to understand that a loss in yield due to disease, a pest invasion or having planted the wrong variety can be catastrophic, and that they have to pay for PD&VCC services. Since PD&VCC are responsible for the sourcing of seedcane, variety control and pest and disease control, this field day will help to put this into perspective and show the value of paying for such services.



Responsibility: AEO, PD&VCC officer and SASRI



Step 24: Harvesting

A lot of capital is invested in the growing of the crop. It is imperative that the harvesting process is correct as this serves to maximise the grower's income. However should there be incorrect harvesting processes applied and delays in transporting the sugarcane to the mill, significant losses in income will accrue to the grower. With this in mind, it is important that a field day be held at the start of the milling season. This may not coincide with the actual day of harvesting the plot since this is a seedcane plot and cane will be sold in small lots. However, a portion of the plot can be harvested for demonstration purposes.



The **Harvesting Field Day** (Appendix 19) must transfer the knowledge and skills to the growers and contractors about the correct cutting, topping and handling of sugarcane. Once the cane is cut and stacked, every hour of delay in getting the cane to mill represents a loss of sucrose and thus income to the grower. Sugarcane should be transported to the mill within 48 hours, after which deterioration in cane quality is exponential.

Different varieties of sugarcane have different maturing times and need to be harvested at the peak sucrose period of that particular variety. Growers are paid for Recoverable Value (RV) and need to take advantage of sucrose peaks in order to increase their income. Different climatic zones in the province also have varying growth cycles which are dependent on heat units and rainfall. Growers and contractors need to be aware of this since it significantly affects the income from the crop.

This field day must ensure that growers are aware of the importance of correct harvesting and the costs involved in harvesting. All role-players should be requested to attend this field day since it is the final stage of the project process.

Step 25: Role-Players Feedback

The purpose of this field day is to show the important role-players the increased acceptance and development of sugarcane production in the area and where their investment has been spent, as well as the returns from the project.

A **Role-player Field Day** must be held to which all the major role-players are invited. This is an exciting and rewarding field day, since it is the culmination of the year's work and a demonstration of the success of the project as a result of commitment, training and time invested by all role-players. It is also an opportunity for the grower to showcase his/her crop and attain a sense of achievement for a job well done.

The field day starts with presentations by the local Agricultural Extension Officer and other important members of the extension outreach group in the area. After the presentations, a field inspection is held to show the growth of the project and the potential of the area for sugarcane production and expansion. This field day is held once a year.

Responsibility: AEO



Step 26: Variety Yield Estimates and Seedcane Distribution

The AEO's programme of work must revolve around both the planting of the demonstration plots and the future issuing and pricing of seedcane from the plot. **A Yield Estimating Field Day** (Appendix 20) must be held at which the AEO will demonstrate how to estimate yield from each variety. The value of estimating the yield will be transferred into a presentation on a whiteboard to show the costs incurred by the plot (documented on a data sheet since the inception of the plot), estimated income from the crop, and subsequent net income from selling the seedcane produced.

This step is vital in emphasising the value of a high-yielding healthy cane crop and good management. This field day brings clarity to the grower that the demonstration plot has turned into a business from which he/she realises a profit. In addition, he/she must also accept that they may need to set aside part of this income for the following ratoon crop (once donor funding ceases). The actual costs of ratoon maintenance can be calculated to assist them.

Since the mills pay on recoverable value (sucrose percentage) and not on tonnage delivered, this needs to be explained to the growers and a sucrose evaluation conducted. The sucrose % of the individual varieties needs to be determined, either by the use of a refractometer measurement or by sending of a 12 stick (10 kg) sample to the SASRI laboratory for an accurate measurement. This information will then determine the realisable value of each variety. From this information, the growers can evaluate the monetary value of different varieties for their sites. The seedcane is then sold on a per ton basis which is harvested in metres (length) per 4 rows.

Responsibility: AEO

Step 27: Cane Payment

The grower gets paid only when he/she has harvested and delivered the cane to the mill once the milling season starts. The mill will give each grower a mill cane payment statement which indicates the amount of cane supplied per field and the variety and quality of the cane delivered. Payment is then determined by the amount of Recoverable Value (Sucrose %). **A Cane Payment Field day** (Appendix 21) is important particularly for new growers and is vital to explain the mill statement. This enables comparisons between different fields, varieties and growers, and allows for exploring reasons for the difference in the potential and actual yields achieved e.g. lower yields due to inadequate fertilisation, drought, weeds etc. This is the crux of the business end of the project, where the payment based on cane quality is realised. In addition, costs incurred in the growing of the crop, contractors fees and haulage costs are all reflected and subtracted from the profit.

Responsibility: AEO



IMPLEMENTATION METHODOLOGY

**Existing Demonstration Plot
(Ratoon Crop)**



Ratoon Management

The first ratoon crop will be the second crop produced from the demonstration plot. This crop will also be sold for seedcane within the community. The training and site management aspects will follow a similar stepwise approach as the plant crop, and serve to consolidate grower skills enabling the grower to become more confident and independent, thus ensuring that the grower can be sustainable once the project moves to a new grower or site. The ratoon management phase of the demonstration plot project is of critical importance as this is where maximum profits are obtained. The agronomic management of the ratoon crop ensures longevity of future ratoons as well as the profitability.



The grower must trash the plant and first ratoon crops since these will always be sold as seedcane and burning will kill the stalk and thus germination viability. For the subsequent ratoons (once the demonstration plot has reverted to a commercial crop) the grower has two options; the grower can either burn the cane at harvest, or trash. The grower will make this decision based on several factors including aspect, soil form, area etc. according to 'best practice' principles and soil conservation norms. The industry is moving strongly towards 'green' sugarcane production whereby trashing is promoted and this should be the overriding message given by the AEOs wherever possible. If burning is recommended, cane tops must be scattered across the field to enhance sustainability of the resources, such as moisture retention, soil and soil fertility preservation and to increase soil organic matter.

Responsibility: AEO

Step 1: Soil Fertility – Topdressing Field Day

A **Topdressing Field Day** (Appendix 15) must be held to demonstrate the correct method to apply the topdressing fertiliser, at the rates specified by the Fertiliser Advisory Service (FAS) from the original soil sample submitted. The original submission form should have been completed accurately with the co-operator/s for submission to the SASRI laboratories for soil fertility recommendations, thereafter the recommendations can be reviewed. The importance of correct fertilisation of the crop must be stressed and an accurate yield potential of each site must be carefully estimated and filled in on the form to achieve a precise recommendation and to avoid under- or over-fertilisation.



Responsibility: AEO



Step 2: Soil Conservation Maintenance

The AEO must inspect any existing soil conservation works and ensure they are maintained or improved if necessary, to ensure efficacy. This cost will be borne by the co-operator and undertaken by a contractor if necessary.

Responsibility: AEO

Step 3: Weedicide Application

The AEO must hold a **Weedicide Application Field day** (Appendix 13) at which he/she must refresh the principles of knapsack calibration, use of chemicals etc. and elaborate on the wider options of available chemicals. For post-emergent weeds, it is preferable to use a long-term weedicide in all cases, since sugarcane takes a minimum of 16 weeks to canopy. Weedicide application rates and the maintenance of equipment messages can also be repeated. The AEO must ensure that the chemicals required are purchased from project funding or by the co-operator. If this cost is borne by the co-operator, the cost of seedcane will be higher. The AEO must ensure that the weedicide is applied at the correct rate and under suitable environmental conditions (Refer to SASRI Herbicide Guide).

Responsibility: AEO



Step 4: Weed Inspection

The AEO must inspect the plot approximately eight weeks after the first weedicide application. He/she must identify the weed spectrum and make a decision as to whether hand hoeing is necessary and / or a short term weedicide is needed.

Responsibility: AEO

Step 5: Leaf Sampling and Pest and Disease Inspection

A **Leaf Sampling and PD&VCC Field day** (Appendix 16, 17 & 18) is optional, however when taking leaf samples it is highly recommended to establish whether there are any nutrient deficiencies which can then be corrected before they lead to yield reduction. PD&VCC inspections are important since this ratoon is still a seedcane crop and must remain strictly disease-free. RSD samples must be taken by the PD&VCC officers. Off-type plants must be identified and removed by the co-operator.

Responsibility: AEO



Step 6: Variety Yield Estimates and Seedcane Distribution Planning

A **Yield Estimating Field Day** (Appendix 20) must be held where the AEO will demonstrate how to estimate yield from each variety. The value of estimating the yield will be transferred into a presentation on a whiteboard to show the costs incurred by the plot (documented on a data sheet since the inception of the plot), estimated income from the crop, and subsequent net income from selling the seedcane produced. This Field Day covers the business aspects of the project and sets the grower up to continue as a commercial grower from the next ratoon. In addition, the grower must set aside part of the income for the following ratoon crop since donor funding now ceases. The accounting system developed after the plant crop is to be used from this point on to assist the grower in becoming self-sufficient. After the first ratoon the grower will be responsible for the sugarcane crop and future development of the business.



Responsibility: AEO

Step 7: Seedcane Distribution

The yield estimates will determine the realisable value of each variety from the plot. From this information, the growers can evaluate the value of different varieties for their sites and the estimated income each variety can be realised. The seedcane is then sold on a per ton basis which is harvested in metres (length) per 4 rows. The AEO must already have identified the new growers for expansion within the area and the placement of the varieties on offer from the plots. The AEO must record this information at the Mill Cane Committee Meetings.

Responsibility: AEO

Step 8: New Growers and Area Expansion

The AEO must document the new grower details and the areas planted from the demonstration plots. This can be used for the evaluation of extension methodology and delivery in these communities. This is also important to the local mill since these areas represent the greatest opportunity for both horizontal and vertical expansion in sugarcane supply.

Responsibility: AEO



Expansion of Sugarcane to the Surrounding Area

In addition to the initial demonstration plot, the AEO will, each year, identify new sites for further demonstration plots. The AEO PoW will have many other commitments and activities e.g. livestock, community gardens and other growers, but the expansion of sugarcane and the support for new growers must continue. From the perspective of sugarcane, the demonstration plot will have highlighted the viability of this crop to other members of the community. The AEO must now, using the seedcane produced from the initial co-operator, ensure the expansion of the sugarcane industry in the area. This is not only to increase the mill supply, but to secure the supply of sugarcane to the mill in future. In addition, this represents an opportunity for improved income for new growers and a monetary injection for the community as a whole. The AEO, with the community, must select a new seedcane merchant every year to ensure a continuity of seedcane production through demonstration plots in the area and to provide additional sites for technology transfer. The original co-operator, after the first ratoon, now reverts to being a commercial grower and his/her plot will no longer be used for demonstration.

With the demonstration plot methodology, a profitability comparison can be made to other cropping enterprises and livestock. The community must be assisted to match the various land uses to the resource base available to achieve the best income, as well as meeting other priorities which may be culturally or socio-economically driven within the community. The availability of locally produced seedcane opens up another option to the community for expansion, either as individual growers or co-operatives. Individual growers can either fund their own planting or acquire funding. Should funding become available for co-operatives, the demonstration plot seedcane can be used.

A competent AEO will be able to assess the viability of expanding sugarcane onto additional land and must ensure that a new demonstration plot is planted every year to continue the supply of seedcane and transfer of technology. The AEO may develop more than one plot per annum.



Technology Transfer

The demonstration plot methodology offers a unique dual function. On the one hand, it allows for the production of a source of suitable locally-produced (thus cheaper) seedcane, while, on the other hand, it also provides an outdoor 'classroom' where skills can be developed and technology transferred via infield demonstrations. It is important for the AEO to understand the needs of the community while assisting them to realise a better livelihood through the development of a sugarcane project (alongside other agricultural activities).

Objectives of Demonstration Plot Field Days

1. Create Awareness

Field days are critical for:

- Developing awareness within the community regarding the potential of the area for sugarcane production;
- Indicating the level of support (technology, finance and equipment) that will be given during such a project.
- Introducing new and existing varieties. SASRI, PD&VCC are critical to project success. The correct variety for the local area conditions must be selected (pre-selection by PD&VCC officers in each area must be followed) and more than one variety can be compared in the demonstration plots. These varieties are originally sourced from commercial growers in the area as guaranteed disease-free. This gives growers a choice of varieties which they possibly have not had and/or are higher yielding (more suitable varieties not previously grown in the area). The varieties can also be planted on different soil forms in the area to demonstrate the importance of matching different varieties to soil form.
- Demonstrating the value of PD&VCC visits, which are conducted regularly to establish any change in disease or pest occurrence in the area. These visits can coincide with information/farmers days to 'sell' the value of these inspections – inspectors can give presentations to the growers at these days to explain (in local language) the importance of regular monitoring to prevent pest and disease outbreaks and loss of production. The growers must see the value of paying for these services.
- Raising awareness of the reduction in planting costs for new growers due to the local production of seedcane thus lowering transport costs. This also reduces the time delay to planting, and seedcane can be accessed as needed and in small lots for ease of planting where labour units are limited.

Preparation and Monitoring at Field Days:

The AEO must have a system to plan and monitor each field day. Each field day should include three sections: (i) formal lecture/talk; (ii) practical/demonstration session and (iii) social/informal session for discussion and questions and answers (with or without refreshments depending on availability of funding).



Each field day must be documented by the AEO and must be planned with: an agenda, attendance register, minutes, notes on additional needs as they arise, issues to be addressed with community leadership etc. Time must also be allocated for an informal report back session where feedback on progress, solutions to issues of concern and other challenges can be addressed.

The AEO should strive to involve independent guest speakers such as researchers/college staff/academic institution lecturers to assist with technology transfer at field days and give independent opinion on the project. This offers an opportunity to recognise pitfalls or successes from previous projects. Having guests at the site creates an expectation and increased interest by the growers and AEO to improve their output, by having 'something positive' to show, and generates a sense of pride and achievement in the growers.

The message delivered must be easily understood, preferably in the growers' home language (or with the aid of an interpreter). The message can be accompanied by posters, pictures and pamphlets handed out on the day where the concept is explained in greater detail and in the home language. In addition, a practical element should be included which demonstrates the theme on the plot itself e.g. soil sampling, knapsack spraying etc. It is also important to involve the attendees by getting them involved in the practical portion of the message. For example: make them pace out the approximate boundary of the plot to demonstrate the size of a one hectare block since, in many instances, they cannot visualise the extent of one hectare; or: encourage the attendees to each apply one tin of fertiliser or use a knapsack sprayer. A photographic report is useful from the various field days.

Information packs have been developed for each field day and can be found as Appendices at the end of this manual.

2. Grower Skills Development through Technology Transfer

The introduction of a new crop in a community requires many technology transfer events on an on-going basis since the growers need to understand and develop the skills required to become successful in a new industry. The entire agronomic process must be developed over the season and links made between the need and the reason for each of the steps. Technology transfer to small-scale growers must be delivered in a structured manner which is aligned to the agronomic cycle. The AEO should regularly meet with and visit growers to establish his/her credibility, understand their individual needs, and challenges and share local knowledge and research/technology advancements. The AEO must establish a monthly programme of work for the year ahead linking the technology transfer messages to agronomic stage e.g. weedicides in spring and autumn but not winter etc. (These steps have been outlined in Chapter 3).

3. To expand the area under sugarcane cultivation

From the initial land use plan, all areas suitable for sugarcane production within a community can be identified, and the viability of further expansion can be assessed. Expansion will result from the local community seeing the value of sugarcane as a cropping option grown in the demonstration plots. The plots will also have shown the potential for increased yields, the improved credibility of and co-operation with the role-players, the income opportunity and natural resource potential available to the community. In addition, **savings** to the other growers in the community will have been realised through the following being achieved by the Demonstration Plot methodology:

- Reduced transport costs due to seedcane being provided from the Demonstration Plot within the community i.e. much reduced transport costs to local transporters thus the money remains within the community.
- Disease-free seedcane which will result in higher yields over the long term as well as more ratoons before incurring replanting costs.



- The correct varieties will be planted for seedcane which will result in higher yields and thus income.
- Cost of seedcane to new growers is lower than that set for commercial growers (due to stakeholders subsidising various input costs), which translates into lower initial setup costs.

The value of a 2 hectare demonstration plot to the initial co-operator and to the local community growers can be extrapolated as follows (using 2013 actual realised figures):

A 2 ha demonstration plot in Noodsberg area produced an average of 100 tons/ha on 2 ha = 200 tons of seedcane produced for plant and first ratoon crops.

Plant and 1 ratoon crop were harvested = 400 tons of seedcane

400 tons of seedcane was sold @ 12 tons per hectare to be planted out by new growers totalling 33 ha new plantings

33 ha produced an average of 100 tons/ha = 3300 tons in plant crop

A further 4 ratoons (on 2 year cycles for Midlands) @ 100 tons/ha produced 16 500 tons @ R395 per ton (2013 price) = **R6.517** million gross income to the community.

This is the value of a two hectare demonstration plot to the community.

4. To create sustainable livelihoods

Improved standards of living and stable income generation for targeted communities have to be the main objectives of the project. This is achieved by following a consistent, progressive, cyclic project process and ensuring that the project is implemented with a vision to generate growth in income, improvement in livelihoods and community development in a stable manner. These projects serve to develop new growers who can become commercial farmers who are self-sustaining, independent and profitable in the long-term. The methodology outlined in this manual encourages and trains farmers to do it for themselves and not to have it done for them. This ensures that simple agronomic steps such as site selection, variety choice, application of weedicides and fertilisers are learnt and can be implemented by the individual growers themselves once project support is withdrawn.



Support for Extension Personnel

- 7.1. To ensure success, the local AEO must be equipped to undertake his/her responsibilities within the community in which they work. This means they must be adequately trained to undertake a sugarcane development project. To enable the AEO to work in a community, he/she must be familiar with the natural resource base of the area, have a good understanding of the local conditions and the suitability for sugarcane production. The information required must be available in a user-friendly format to enable the AEO to rapidly and easily obtain the relevant information e.g. an easily accessible information system such as the DAEA Bio-resource Programme for natural resource planning, manuals on soil suitability and various SASRI manuals.
- 7.2. The AEO must be suitably equipped and enabled to undertake daily tasks. This means that he/she must be suitably qualified, resourced with equipment, transport and the necessary skills to undertake the implementation of a project. If the AEO is inexperienced, they should have access and mentorship from other more experienced ESs or research scientists until such time as they are confident and skilled enough to undertake further projects independently. A list of the basic equipment required is contained in Appendix 5.
- 7.3. Experienced AEOs can mentor new personnel and the demonstration plot methodology is an excellent opportunity to develop new staff.
- 7.4. All Extension Officers should have an annual programme of work (**work plan**) which must include the planting of a minimum of one demonstration plot per annum for the provision of seedcane to targeted communities. This Programme of Work (PoW) is to be signed by the role-players to ensure accountability, implementation and agreement on the project phases.
- 7.5. The focal point of the extension programme is seedcane production and introduction of new varieties to increase the opportunity for income generation. The DAEA is the development agent and must provide finance for the demonstration plots.
- 7.6. The AEOs are to be supported by the ESs and must include all role-players in their extension programmes. A dedicated training programme needs to be implemented by the ESs whereby one day per month is allocated to training of the AEOs for sugarcane. Each AEO needs to include this training programme in their Programmes of Work, based on the Grower Decision Support Programme model as documented in the SASRI-DAEA "Sugarcane Production Module, ratoon management". As far as possible, all grower leadership must be in possession of this document.
- 7.7. The AEOs must report monthly to the ESs in written format reflecting the planned activities, achievements and obstacles. These reports will form the basis of their performance assessments for the year.
- 7.8. The AEOs PoWs should include but not be limited by the following:
 - Grower / Area statistics for the area they are responsible for
 - Extension delivery plan (how/when activities are scheduled per annum)
 - Projects – seedcane demonstration plots and group farming
 - Authority organizations involved in the PoW – stakeholder signatures, MCC Chairperson
 - Focal priority areas (seedcane, varieties, disease, international visitors)
 - Role-players



- Planting of a 2 ha Demonstration plot (per annum).
- Financial plan (money needed for projects)
- Training and mentorship programme

7.9 Monitoring PoW implementation:

The following criteria need to be met in order for successful implementation of the PoW:

- 1) Implement the entire PoW as stipulated at the outset of each reporting year per deliverable
- 2) Plant a 2 ha demonstration plot per annum
- 3) Issue seedcane from the demonstration plot into expansion areas
- 4) Involve all role-players in his PoW

An example of monthly commitments is shown in the table below:

Meetings attended	Days allocated
10 grower groups (Farmers Field Days)	10
RD&E Committee	1
AEO meeting with ES	1
DAEA monthly meeting	1
Administration	1
SASRI Training (Self)	1
MCC Meetings	1
Office days. Project meetings, contract harvest meetings, Traditional Authority meetings, Local environment meetings etc.	6
Total	22 days

There is an average of 22 working days per month. With this in mind the number of grower groups that the AEO can comfortably service and manage is about 10. More than this will result in the AEO being over-committed and not meeting with growers on a regular basis. This will result in meetings being missed and a drop in grower attendance and the eventual collapse of the extension programme. Each AEO should have about 10 grower groups or 1 000 growers. The AEO should be required to meet these groups on a monthly basis for 10 months of the year starting in February and ending in November. Major field days are to be held throughout the year linked to the demonstration plot. Emphasis must be placed on the economics of sugarcane thus ensuring growers continually improve their standard of living. These programmes of work are to be evaluated regularly. The relevant supervisors must continuously monitor and support the AEOs PoW.

7.10 Each mill area is to have an Research, Development & Extension (R,D&E) Committee that is managed by growers and supported by the responsible AEO. The responsible ES is to attend these meetings from a technical capacity only. Where there is no R, D & E committee, one needs to be established.

NOTE: Templates of all appendices are available from your Local Extension Officer



Conclusion

The demonstration plot methodology is a robust mechanism which generates interest in a new enterprise whilst providing significant support for a small-scale grower project. Since the methodology offers an opportunity to both showcase a new enterprise as well as introduce new technologies and research results, it is a visual and tangible outdoor training centre where the concepts are brought to life. The methodology can be applied to other crops as well as livestock projects by substituting activities relevant to those systems. The demonstration plot serves as an entry for technology transfer with regards to environmental issues, job creation, agronomic skills, agricultural best management practices, the creation of business opportunities, economic viability within communities and sustainable land use. The methodology also allows for a whole farm approach, whereby integrated farming systems can be promoted and supported in a sustainable manner.

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Name	Organisation	Title
J Cockburn	Former SASRI	Post Graduate Student (2011- 2013)
J de Lange	Illovo Noodsberg Mill	Cane procurement Manager
F Horn	Illovo Noodsberg Mill	Cane Development Manager
GW Maher	SASRI	Resource Manager Extension
GM Mdunge	DAEA	Agricultural Extension Officer
BW Sithole	DAEA	Agricultural Extension Officer
MJ Way	SASRI	Senior Entomologist
T Webster	Midlands North Pest and Disease and Variety Control Committee	Pest & Disease Officer
J Witthoft	Illovo Noodsberg Mill	Cane Procurement Officer



Appendix 1

Agreement For The Planting Of A Sugarcane Demonstration Plot

.....**Demonstration Plot**

Date Planted.....

At Site (GPS co-ordinates).....

Project Code Number.....

Agreement between the Co-operator, in this case:

Name of Co-operator:.....

Address:.....

.....

and the KZN Department of Agriculture and Environmental Affairs fully understand what is expected of me as detailed below. I will:

1. Make my site available for the plant crop plus one ratoon for the period 20... to 20... (insert years).
2. Ensure the site is fenced and annually prepare firebreaks around the entire demonstration plot .
3. Supply labour for planting and fertiliser application.
4. Supply labour for weeding and weedicide application.
5. Allow field days, be present at field days and allow access to all interested parties.
6. Share information and experience gained with other interested parties.
7. Allow and support PD & VCC inspections.
8. Allow and support visits by the AEO and ES when required even though I may not be available.
9. Be subject to the decisions and recommendations of the PD & VCC.
10. Harvest only when authorised by the ES.
11. Benefit from the sugarcane yield.
12. Accept risk involved with production in an uncontrolled environment.
13. Allow the Agricultural Extension Officer to determine the selling price of the seedcane.
14. Never burn the sugarcane.
15. Should the sugarcane be burnt, the proceeds are to be placed into a suspense account. The MCC will to be responsible for the allocation of the proceeds and what disciplinary measures are to be taken against the responsible person/s.

SIGNED:

- | | |
|----------------------------------------|------------|
| 1. Co-operator | Date |
| 2. KZN, DAEA (Assistant Manager) | Date |
| 3. KZN, DAEA (AEO) | Date |
| 4. MCC Chairperson | Date |

Note: ALL inputs such as, fertiliser, seedcane, equipment, weedicide must be on site **BEFORE** planting of the demonstration plot can commence.



Appendix 2

Job Description Form

Job Title: Extension Officer

Department/District:

Name of Incumbent:

Job Description prepared by:

Date Prepared:

Checked by:

Signature Assistant Manager:

Signature Incumbent:

1. OVERALL PURPOSE OF JOB (i.e. Outline why the job exists in the organisation)

- To promote sound agricultural practices which will add value to the Industry through increased productivity and profitability of small-scale cane growers, in harmony with the environment, and in accordance with SASA and DAEA policies.
- To make and maintain contact with communities within the areas of responsibility and to promote appropriate agricultural extension techniques.
- To measure and report on the adoption of improved farming practices indicating the effect of the Extension Venture Agreement (EVA).
- To manage subordinates where applicable.

2. REQUIREMENTS FOR THE JOB

- Educational, professional/technical/degree/certificate: An appropriate diploma in agriculture and SASRI Senior Certificate course.
- Length and nature of post-educational training and experience required: One year practical field experience and the ability to communicate effectively in English.
- Legal requirements: Code EB drivers' licence.



4. RESPONSIBILITIES

4.1 EXTENSION

- Prepares and submits to the Assistant Manager and the Sugarcane Extension Specialist an annual Programme of Work / Work Plan.
- Arranges appropriate field days and farmer group meetings within the grower structures.
- Attends and assists with the organisation of District shows.
- Provides an extension service to groups and conducts individual farmer visits when required.
- Plans and arranges the planting of demonstration / seedcane plots and conducts regular group visits and training at these plots.
- Promotes regular soil sampling and discusses analysis reports.
- Maintains a service where required, for livestock management and other field crops including horticultural crops on a **80% sugarcane / 20% other commodities** basis.
- Promotes sound conservation and environmental management practices in conjunction with relevant role-players and Government Departments and the Private sector in accordance with the Act

4.2 ADVISORY/SPECIALIST SUPPORT

- Participates in community integrated planning (crop suitability, field layout, crop extraction, surface water management etc.) and the implementation of land use plans.
- Provides advice to support organisations and suppliers (e.g. Chemical and fertiliser companies) regarding community requirements.



- Co-operates with the Resource Conservation Technicians in managing soil and the environment
- Provides information support to financiers (e.g. SA Umthombo Agricultural Finance, SA Cane Growers economists and Cedara specialists).

4.3 FEEDBACK

- Submits monthly reports and work forecasts to Assistant Manager and Sugarcane Extension Specialist.
- Attends, as required, progress report/merit assessment and personal profile interviews.
- Provides written input for the annual report.
- Provides, where required, written or verbal feedback reports at District or Regional level.
- Attends and reports, at appropriate meetings (e.g. Research Development and Extension Committee and Mill Cane Committee meetings) on progress with programme of work.
- Provides regular Sugar Industry feedback to Grower structures.

4.4 EDUCATION AND TRAINING

Growers/farmers

- Provides training and mentorship for cane growers, contractors and other farmers (including: poster presentations, soil sampling, cane estimates, fertiliser and herbicide application, land preparation, cane payment statements, training of office bearers and capacity building, crop irrigation, conservation, tractor driving, implement setting etc.).
- Assists with information transfer at field days or farmer information days.

Demonstration / Seedcane Plots

- Establishes and ensures the maintenance of Demonstration / Seedcane plots used to demonstrate different varieties recommended for the area and recommended sugarcane production techniques and practices.

Staff (self)

- Attends refresher courses organised by SASRI.
- Attends SASRI Senior Certificate courses.
- Attends, as a priority, all meetings arranged by the Sugarcane Extension Specialist.
- Participates in DAEA in-service training.
- Attends other relevant seminars and workshops.

4.5 INSTITUTIONAL SUPPORT

Attends and participates in the following committees:

- Mill Cane Committee (compulsory).
- Contractor Associations (when required).
- Local Farmers Associations and Sub-committees (as required).
- Tribal and Regional Authorities (as required).
- Umthombo Agricultural Finance and other Financiers (as required).
- RRTFs (as required).
- Research, Development and Extension Committees (compulsory).
- Joint Extension Group/ Forums (compulsory).
- Integrated Development Planning Forums (Municipality as required).
- Local Pest, Disease and Variety Control Committee (as required).
- Local Environment Committee (as required).

4.6 ADMINISTRATION

- Conducts general office and administrative duties; including the timely submission of reports, vehicle log sheets etc.

Updated :.....



Appendix 4

Demonstration Plot Annual Implementation and Training Plan

Name DAEA Agricultural Extension Officer:

Demonstration Plot: Annual Implementation Plan, Training & Mentorship Programme

South Region: Name of Senior Manager Agriculture: ES (SASRI):

General Information required from the DAEA Agricultural Extension Officer Demonstration Plot Name:.....

Name AEO	Cell No	Municipality	Assistant Manager	Cell No	Mill Area	Name of Co-operator of Demo Plot	Area ha	GPS Co-ord south	GPS Co-ord east	Varieties

1 ha Demonstration plots are funded by the DAEA Budget amount allocated: R SASRI: R..... Miller: R

Other: R Total: R

All field days must have an Agenda and an attendance register – copies to be sent to ES by responsible AEO, written and photographic report optional. This information will be recorded below.

AEOs are to give ES a copy of the signed agreement with their Co-operators for the demonstration plots

Seedcane obtained from:

Please note: Black is general information - Red is essential field days - Blue is completed field training days All training to be conducted at the Demonstration plot site Updated date:

January	February	March	April	May	June	July	August	September	October	November	December
Check condition of weeds Address issues	Finance for project, proposal / Business Plan completed and submitted Establish dates for training days Essential field training day 1)Pest, Disease and Variety introduction field day	Start collecting growers names for seedcane	This field training day is for growers and contractors Essential field training day 2) Harvesting and Cane quality	Demo Plot site selection Essential field training days 3)Cane payment 4) Role-players field day	These field training days link soil potential to actual money Essential field training days 5) Soil potential and Business skills Mark plot and GPS and soil sampling 6)Estimating field yield to confirm yield	Identify and confirm Seedcane with PD & VCC Officer Essential field training day 7) Field day for seedcane distribution and establish price	Volunteer removal Fencing Essential field training day 8) Soil conservation & farm planning	Confirm seedcane availability Arrange transport Confirm land prep Inputs, fertiliser and weedicide Essential field training day 9) Soil sampling results and costs of fertiliser and weedicides	Start distributing seedcane Essential field training day 10) Planting	Consult stakeholders Inform Stakeholders MCC & R,D & E Committee for the following year Essential field training day 11) weedicide application	Prepare documentation for the following year Essential field day 12)Top dressing
<p>Grading: Date 5 Attendance 3 Theme 2 12 field days x 10 = 120 points Arrange one Role-players field day per Mill area</p> <p>Do not manipulate the system by combining field days</p>											



Appendix 5

List Of Important Field Days

Note: Field day programme for new plots would start from No 5, and would cycle through to 4 as per the agronomic season. Field training days 6 & 7 will be omitted for a newly established plot and will only be undertaken at maturity of the plant crop and into ratoon crops.

No	Activity	Responsible Person	Date	Achieved Yes \ No
1	Pest, Disease and Variety introduction Field Training day	AEO, ES and Local Pest & Disease Officer	February	
2	Harvesting and Cane Quality Field Training day	AEO	April	
3	Cane Payment Field Training day	AEO	May	
4	Role-Players Field day	AEO	May	
5	Soil Potential & Business Skills Field day (Soil form Identification Soil sampling)	AEO, ES & Cane growers Economist	June	
6	Estimating Field training day (Undertaken at crop maturity)	AEO	June	
7	Seedcane price establishment and distribution (Undertaken at crop maturity)	AEO	July	
8	Soil Conservation and Farm Planning Training field day	AEO	August	
9	Soil sampling results and costs of fertiliser and weedicides Field Training day	AEO	September	
10	Planting field day	AEO & Grower leadership	October	
11	Weedicide application field day	AEO & Grower leadership	October	
12	Fertiliser application, top dressing field day	AEO & Grower leadership	November	



Appendix 6

Site Soil Information

Soil Profile Description: Demonstration Plot

Grower Group:

Date:

Grower Name		Name of Soil Surveyor	
Demo Plot Name			
Mill Name			
Terrain	Crest		GPS
	Mid slope		South quadrant
	Valley bottom		GPS
"A" Horizon	Orthic		East quadrant
	Melanic		Elevation
	Vertic		ASL (M)
	Humic		Bioresource Unit code
	Organic		
Colour	Br. Bl. Gr. Rd		Estimated yield (t/ha)
Texture	0 – 5		Recommended
	6 – 15		Varieties
Topsoil	16 – 35		
	36 – 55		
Clay %	> 55		
"A" horizon depth (mm)		Recommended Weedicides	
"E" horizon (mm)			
"B" horizon	G 'gleyed'		Sugarcane price/ ton
	Red apedal		Estimated income / ha
	Yellow brown apedal		Field day attendance
	Red structured		(number)
	Soft or hard plinthic		Information handed out
	Prismacutanic		
	Pedocutanic		
	Lithocutanic		
	Neocutanic		
	Regic sand		
Alluvium			
Saprolite-weathering rock			
Hard Rock			
Other			
Colour: Br. Bl. Gr. Ye. Rd. Mot			
Texture B horizon	0 – 5		General Comments
	6 - 15		
	16 - 35		
	36 – 55		
Clay %	> 55		
"B" Horizon depth (mm)			
"C" Horizon (Parent material) (mm)			
Total pit depth (mm)			
Effective rooting depth (mm)			
Surface rock yes / no			
Soil sample taken yes / no			
Soil Form and family		Name of Agricultural Extension Officer	

Appendix 7

Etsheni Soil Form Photos

Etsheni Demonstration Plot Area: 1 Ha



Role Players Attending



WA Gillespie: Soil form Identification

Field Day

Date: 12 / 08 / 2010

Attendance: 14

Presentations:

- Soil Form Identification: WA Gillespie
- Increasing area under sugarcane: WA Gillespie

Soil Form: Sweetwater

Effective rooting depth: 1m plus

Expected potential: 100 tons sugarcane / ha

GPS Readings: S 29 52 65

E 030 70 00

Altitude: 858m ASL



Estimating Potential



Soil Depth: 2m +


Role Players Attended

WA Gillespie: SASRI
F Horn: Noodsberg Mill
GM Mdunge: DAEARD
S Gwala: Co-operator


Appendix 8

Nomyela Soil Form Photos Poster Presentation


Nomyela Demonstration Plot Area: 1 Ha



Role Players Attending




EO: BW Sithole



ES: WA Gillespie


Role Players Attended

WA Gillespie: SASRI
T Webster: MN P & D
D Wilkinson: SASRI
F Horn: Noodsberg Mill
BW Sithole: DAEARD
D Ngcobo:
Co-operator



Soil Form: Kranskop

Soil Depth: 2m +



Field Day

Date: 10 / 08 / 2010
Attendance: 20
Presentations:

- Soil Form Identification: WA Gillespie
- Increasing area under sugarcane: WA Gillespie

Soil Form: Kranskop
Effective rooting depth: 2m plus
Expected potential: 120 tons sugarcane / ha
GPS Readings: S 29 23 234
E 030 53 748

Appendix 9

Plant Cane Business Skills Information

Income for 1 ha			
1	Soil Potential tons / ha		
	Cost / ton sugarcane at 12, 5 % RV	Tons x	Cost / ton R
			Total income R
Expenditure / Plant Cane for 1 ha			
2	Plough		
	Disc x 2		
	Ridge		
	Seedcane cost / ton		
	Soil Sample analysis		
	Fertiliser / plant		
	Fertiliser / top dress + labour		
	Labour for planting		
	Weedicide + labour		
	Labour / hand hoeing		
	Labour / fire breaks		
	Harvesting	Rand / ton	
	Loading	Rand / ton	
	Transport	Rand / ton / km	
Total Costs			
Profit / Loss for 1 ha for above Potential for 1 ha			
3	Income R	minus	Expenditure R
			R
Money for Ratoon Management for 1 ha			
4	Fertiliser for top dressing + Labour		
	Weedicide for weed control + labour		
	Hand hoeing – weed control		
	Hand hoeing – fire breaks		
	Total costs		

Aim to plant for maximum yield potential

Repeat this for 60, 80, 100 & 120 tons / ha

Repeat this exercise for 1ha & 2 ha for planting

NB: Include putting aside money for ratoon costs



Appendix 10

Ratoon Cane Business Skills Information

Income				
1	Soil Potential tons / ha			
	Cost / ton sugarcane at 12, 5 % RV	Tons x	Cost / ton R	Total income R
Expenditure / Plant Cane				
2	Soil Sample analysis (after 2 nd ratoon)			
	Fertiliser / top dress + labour			
	Weedicide + labour			
	Labour / hand hoeing			
	Labour / fire breaks			
	Harvesting	Rand / ton		
	Loading	Rand / ton		
	Transport	Rand / ton / km		
	Total Costs			
Profit / Loss for 1 ha for above Potential				
3	Income R	minus	Expenditure R	R

Aim to plant for maximum yield potential

- Repeat this for 60, 80, 100 & 120 tons / ha
- Repeat this exercise for 1ha, 2ha, 5ha, 10ha & 20ha at yield potential
- Include putting money aside for replanting and next ratoon expenditure



Appendix 11

Soil Conservation Measures and Run off Control Field Day

List of equipment required

1. SASRI Soils book
2. SA Soil Classification “blue” book
3. Mini run off plots
4. Spade & spirit level
5. Soil auger
6. Clipboard
7. Water
8. Soil form identification forms
9. White board
10. White board paper
11. White board pens
12. Ingede publications
13. SASRI Information sheets
14. Link publications
15. Agenda
16. Attendance register forms

Order of field day presentation

1. Introduce the topic
2. Give Soil Conservation measures Lecture
3. Explain the Value of soil conservation

Practical

1. Use the mini runoff control plots
2. Explain the value of trashing, soil and water retention
3. General




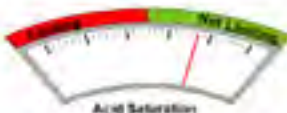
Order of Presentation

- Lecture
- Demonstration
- Open discussion
- What we have learned (General)
- Next step (General)



Appendix 12

Soil Sampling Results

FAS		FERTILISER ADVISORY SERVICE - SOIL ANALYSIS REPORT			SA Sugarcane Research Institute																																									
Tel: 031 508 7474 / 75		Fax: 031 508 7593		Email: fertiliser.advisory@sugar.org.za																																										
Date Received:	19/07/2012	FAS Lab ID:	GS 3237	Report Date:	16/08/2012																																									
CLIENT DETAILS Grower No. FAS No. 9223 Email: william.gilmer@sugar.org.za Extension Area: Midlands North		ADVISOR DETAILS		CROP AND FIELD DETAILS Sample ID or Field Number: 11 GPS Coordinates Sample Depth: 0 to 20 cm Crop: Plant Cycle Variety: N12 Is Cane Trashed?: No Is Cane Irrigated?: No Green Manure Crop Type: None Green Manure Crop Yield: N/A Attainable Yield at Harvest: 120 tons cane/ha																																										
Analysis	Unit	Sample Value	Threshold	Result in kg/ha	Comment	Note: Thresholds, Comments and Key indicators are sample specific and based on the attainable yield indicated on the submission form. KEY INDICATORS  Soil Phosphorus  Soil Potassium  Acid Saturation																																								
pH (in calcium chloride)		4.37																																												
Phosphorus (Truog)	mg/L	0.5	14.6	1	Low																																									
Potassium (K)	mg/L	26	154	52	Low																																									
Calcium (Ca)	mg/L	303	300	605	Adequate																																									
Magnesium (Mg)	mg/L	544	50	1087	Adequate																																									
Sodium (Na)	mg/L	454																																												
Exchangeable Acidity (Al+H)	cmol/L	1.21																																												
Total Cations	cmol/L	11.70																																												
Acid Saturation	%	10.34	20.00		Not limiting																																									
Exchangeable Sodium % (ESP)	%	16.6			Limiting																																									
Ca/Mg (Equivalence ratio)		0.2			Limiting																																									
Zinc (Zn)	mg/L	0.1	1.5		Low																																									
Copper (Cu)	mg/L	2.7	0.8		Adequate																																									
Manganese (Mn)	mg/L	1	2		Low																																									
Iron (Fe)	mg/L	13	3		Adequate																																									
Silicon (Si)	mg/L	5	15		Low																																									
Clay Estimate	%	3																																												
Organic Matter Estimate	%	5.3																																												
Nitrogen (N) Category	cat	4																																												
N Volatilization	%	2	15		Not limiting																																									
Volume Weight	g/ml	1.14																																												
Analysis Notes: 1. P analysis by Truog method. 2. Sum of potassium, calcium, magnesium, sodium and (NH ₄) ₂ in non-saline soils. This % is a measure of the effective cation exchange capacity (CEC). 3. Rating of potential N release from the soil organic matter (1 = low, 4 = high). N recommendations are adjusted according to this rating. 4. Potential N volatilization. If >15, urea should not be used as a topdressing.				POSSIBLE FERTILISER OPTIONS <table border="1"> <thead> <tr> <th>Fertiliser</th> <th>Furrow (kg/ha)</th> <th>Topdress (kg/ha)</th> </tr> </thead> <tbody> <tr> <td>Plant</td> <td>2-3-4 (30)</td> <td>450</td> </tr> <tr> <td>+ Urea</td> <td></td> <td>180</td> </tr> <tr> <td>+ Pot Chloride</td> <td></td> <td>160</td> </tr> <tr> <td>or MAP(33)</td> <td>200</td> <td></td> </tr> <tr> <td>+ Urea</td> <td></td> <td>180</td> </tr> <tr> <td>+ Pot Chloride</td> <td></td> <td>500</td> </tr> <tr> <td>Ratoon 1</td> <td>1-6-2 (68)</td> <td>300</td> </tr> <tr> <td>or Urea</td> <td></td> <td>300</td> </tr> <tr> <td>+ Pot Chloride</td> <td></td> <td>500</td> </tr> <tr> <td>Ratoon 2</td> <td>MAP(33)</td> <td>100</td> </tr> <tr> <td>+ Urea</td> <td></td> <td>250</td> </tr> <tr> <td>+ Pot Chloride</td> <td></td> <td>500</td> </tr> </tbody> </table> N.B. The above fertiliser options are approximations based on extremely local conditions.				Fertiliser	Furrow (kg/ha)	Topdress (kg/ha)	Plant	2-3-4 (30)	450	+ Urea		180	+ Pot Chloride		160	or MAP(33)	200		+ Urea		180	+ Pot Chloride		500	Ratoon 1	1-6-2 (68)	300	or Urea		300	+ Pot Chloride		500	Ratoon 2	MAP(33)	100	+ Urea		250	+ Pot Chloride		500
Fertiliser	Furrow (kg/ha)	Topdress (kg/ha)																																												
Plant	2-3-4 (30)	450																																												
+ Urea		180																																												
+ Pot Chloride		160																																												
or MAP(33)	200																																													
+ Urea		180																																												
+ Pot Chloride		500																																												
Ratoon 1	1-6-2 (68)	300																																												
or Urea		300																																												
+ Pot Chloride		500																																												
Ratoon 2	MAP(33)	100																																												
+ Urea		250																																												
+ Pot Chloride		500																																												
LIME AND NUTRIENT RECOMMENDATIONS <table border="1"> <thead> <tr> <th rowspan="2">Crop</th> <th colspan="2">Lime</th> <th rowspan="2">N kg/ha</th> <th rowspan="2">P kg/ha</th> <th rowspan="2">K kg/ha</th> </tr> <tr> <th>t/ha</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>Plant</td> <td>0.0</td> <td></td> <td>90</td> <td>45</td> <td>240</td> </tr> <tr> <td>Ratoon 1</td> <td>0.0</td> <td></td> <td>130</td> <td>0</td> <td>240</td> </tr> <tr> <td>Ratoon 2</td> <td>0.0</td> <td></td> <td>130</td> <td>25</td> <td>240</td> </tr> </tbody> </table>						Crop	Lime		N kg/ha	P kg/ha	K kg/ha	t/ha	Type	Plant	0.0		90	45	240	Ratoon 1	0.0		130	0	240	Ratoon 2	0.0		130	25	240															
Crop	Lime		N kg/ha	P kg/ha	K kg/ha																																									
	t/ha	Type																																												
Plant	0.0		90	45	240																																									
Ratoon 1	0.0		130	0	240																																									
Ratoon 2	0.0		130	25	240																																									
Agronomic Comments: <ul style="list-style-type: none"> Where high levels of Etiana are anticipated, it is advisable to reduce N recommendations by 20 to 30 kg/ha. The maximum K that should be applied in the planting furrow is 100 kg/ha. The remainder should be broadcast. Zinc is below threshold. Where possible use a fertiliser mixture that contains zinc. Contact your Extension Specialist regarding silicon requirements for soil. It is suggested that soil samples be taken for salinity/acidicity analyses as ESP is limiting. 																																														

FAS-SR-04 Rev01

Disclaimer: While every care has been taken in the preparation of the above advice, neither SA Sugarcane Research Institute nor its Consultants or Employees will be liable for any loss or damage (direct or indirect) which you or anyone else may suffer arising out of or in connection with the advice or any deficiencies in the advice.



Appendix 13

Weedicide and Herbicide Field Day

List of equipment required

1. Poster
2. Ratoon production calendar
3. White board
4. White board paper
5. White board pens
6. Weed control script
7. Knapsack sprayer
8. Nozzles
9. Stop watch
10. Tape measure
11. String
12. Pegs
13. Bucket
14. 200 L drum
15. Measuring jug
16. 2 Litre Coke bottle
17. Herbicide
18. Water for calibration (drinking water)
19. Protective clothing
20. Ingede publications
21. SASRI Information sheets
22. Link publications

Order of field day presentation

1. Introduce the farming calendar – Ingede
2. Introduce the topic and objective
3. What and Why? – Page 1
4. Stages of weed growth – Page 2
5. Weed control methods – Page 3 & 4
6. Spraying and storage of weedicides - Page 5
7. Symptoms of herbicide damage weedicide poster – Page 6

Practical

1. Knapsack calibration
2. Summary and questions
3. Conclusion

Order of Presentation

- Lecture
- Demonstration
- Open discussion
- What we have learned (General)
- Next step (General)



Appendix 14

Planting Field Day

List of equipment required

1. Agenda
2. Attendance register
3. SASRI Planting Poster
4. SASRI Soil Sample Results
5. SASRI Sugarcane Course Notes
6. White board
7. White board paper
8. White board pens
9. Seedcane
10. Fertiliser
11. Cane Knives
12. Carbolic acid (Jeyes fluid)
13. Container to soak cane knives in carbolic acid
14. Hoe
15. Camera
16. Computer
17. Data projector

Order of field day presentation

1. Introduction – Farming Calendar (Ingede)
2. Introduce the topic and objective
3. Justify the need to talk about fertiliser management - Pages 1 and 2
4. Soil sampling - Page 3
5. Timing of Fertiliser Application – Page 4
6. How to apply fertiliser – Page 5

Practical

1. Fertiliser application – Practical
2. Summary and Questions
3. Conclusion

Order of Presentation

- Lecture
- Demonstration
- Open discussion
- What we have learned (General)
- Next step (General)



Appendix 15

Fertiliser Field Day

List of equipment required

1. Fertiliser Poster
2. Ratoon Production Module
3. White Board
4. White Board Paper
5. White Board Pens
6. Fertiliser Script
7. Tape Measure
8. String
9. Pegs
10. Mayfield Applicator
11. 500 ml oil tin / fish tin
12. Fertiliser application chart
13. Fertiliser
14. Ingede publications
15. Link publications
16. SASRI Information sheets
17. Soil sample bags
18. Soil sample tickets
19. Leaf sample tickets
20. Soil sampler
21. Soil Auger

Order of field day presentation

1. Introduction – Farming Calendar (Ingede)
2. Introduce the topic and objective
3. Justify the need to talk about fertiliser management - Pages 1 and 2
4. Soil sampling - Page 3
5. Timing of Fertiliser Application – Page 4
6. How to apply fertiliser – Page 5

Practical

1. Fertiliser application – Practical
2. Summary and Questions
3. Conclusion

Order of Presentation

- Lecture
- Demonstration
- Open discussion
- What we have learned (General)
- Next step (General)



Appendix 16

Pests Field Day

List of equipment required

1. Agenda
2. Attendance register
3. SASRI Eldana Manual
4. SASRI Information sheets
5. SASRI Sugarcane Course Notes
6. White board
7. White board paper
8. White board pens
9. Sugarcane Insect specimens
10. Ingede publications
11. Sugarcane Ratoon Production Module – Booklets
12. Sugarcane Ratoon Production Module - Poster
13. Camera
14. Knife to split sugarcane
15. SASRI Sugarcane Pests poster

Order of field day presentation

1. Introduce the topic
2. Give the Sugarcane Pest Poster presentation
3. Explain the economic loss caused by Pests

Practical

1. Conduct a field inspection
2. Split open sugarcane stalks to show damage
3. Explain suitable varieties that can be planted
4. Explain management of sugarcane to control Pests
5. General

Order of Presentation

- Lecture
- Demonstration
- Open discussion
- What we have learned (General)
- Next step (General)



Appendix 17

Diseases Field Day

List of equipment required

1. Agenda
2. Attendance register
3. SASRI Sugarcane Diseases book
4. SASRI Information sheets
5. White board
6. White board paper
7. White board pens
8. Sugarcane Disease specimens
9. Ingede publications
10. Sugarcane Ratoon Production Module – Booklets
11. Sugarcane Ratoon Production Module - Poster
12. SASRI seedcane book
13. Camera
14. Knife to split sugarcane
15. SASRI Sugarcane Diseases poster

Order of field day presentation

1. Introduce the topic
2. Give the Sugarcane Diseases Poster presentation
3. Explain the economic loss caused by Diseases

Practical

1. Conduct a field inspection
2. Split open sugarcane stalks to show damage
3. Show diseases on leaves
4. Explain suitable varieties that can be planted
5. Explain management of sugarcane to control Diseases
6. General

Order of Presentation

- Lecture
- Demonstration
- Open discussion
- What we have learned (General)
- Next step (General)



Appendix 18

Eldana Field Day

List of equipment required

1. Agenda
2. Attendance register
3. SASRI Eldana Manual
4. SASRI Information sheets
5. White board
6. White board paper
7. White board pens
8. Eldana specimens
9. Ingede publications
10. Sugarcane Ratoon Production Module – Booklets
11. Sugarcane Ratoon Production Module - Poster
12. Sugarcane pest specimens
13. Camera
14. Knife to split sugarcane
15. SASRI Sugarcane Pests poster

Order of field day presentation

1. Introduce the topic
2. Give the Sugarcane Pests Poster presentation
3. Explain the economic loss caused by Eldana

Practical

1. Conduct a field inspection
2. Split open sugarcane stalks to show damage
3. Explain suitable varieties that can be planted
4. Explain management of sugarcane to control Eldana
5. General

Order of Presentation

- Lecture
- Demonstration
- Open discussion
- What we have learned (General)
- Next step (General)



Appendix 19

Harvesting Field Day

List of equipment required

1. Agenda
2. Attendance register
3. SASRI Harvesting poster
4. Harvesting script
5. White board
6. White board paper
7. White board pens
8. Cane knives
9. Ingede publications
10. Sugarcane Ratoon Production Module – Booklets
11. Sugarcane Ratoon Production Module - Poster
12. Camera
13. Tape measure
14. Scale
15. Cane smock
16. SASRI Information sheets
17. Computer
18. Data projector

Order of field day presentation

1. Introduce the Farming Calendar
2. Introduce the Topic
3. Need for correct Harvesting – Financial Gain
4. Method – Harvesting: page 1
 - Topping: Height page 2
 - Base Cutting: Page 3
 - Timing: Page 4
 - Burning to Crush Delay: Page 5
 - Special Harvesting: Page 6

Practical

1. Demonstration
2. Summary and Questions (Include harvesting costs)
3. Conclusion
4. General

Order of Presentation

- Lecture
- Demonstration
- Open discussion
- What we have learned (General)
- Next step (General)



Appendix 20

Yield Estimating Field Day

List of equipment required

1. Sugarcane Production Module; Ratoon Management (Ingede)
2. Sugarcane Production Module Stand
3. White board
4. White board paper
5. White board pens
6. Sugarcane estimating script
7. Tape measure
8. Scale
9. String
10. Calculator
11. Sugarcane Senior Course notes
12. Ingede publications
13. Link publications
14. Soil auger
15. Identification and management of soils book
16. Soil profile description form

Order of field day presentation

1. Introduce the topic
2. Introduce the Farming Calendar – Ratoon Production Module Pages 7 & 8
3. Need for an Estimate
4. Types of Estimates
 - Stick Measurement – Ratoon Production Module pages 11 & 12
 - Destructive Sample method
 - Experience method

Practical

1. Demonstration in the field
2. Summary and Questions
3. Conclusion

Order of Presentation

- Lecture
- Demonstration
- Open discussion
- What we have learned (General)
- Next step (General)



Appendix 21

Sugarcane Payment Field Day

List of equipment required

1. Agenda
2. Attendance register
3. Cane payment statement
4. SASRI Information sheets
5. SASRI Sugarcane Course Notes
6. White board
7. White board paper
8. White board pens
9. Sticks of Sugarcane
10. Camera
11. White board pens
12. Computer
13. Data projector
14. Calculator

Order of field day presentation

1. Introduce the topic
2. Explain the Cane Payment statement results
3. Give growers examples to do

Practical

1. In the field discuss correct harvesting and cane quality on income
2. General

Order of Presentation

- Lecture
- Demonstration
- Open discussion
- What we have learned (General)
- Next step (General)



Appendix 22

Agricultural Extension Officer Equipment

All the AEOs must have the following standard equipment:

1. A suitable vehicle
2. 16 litre knapsack sprayer and nozzles
3. Protective clothing
4. GPS for field measurement and locality
5. A computer
6. Scale for weighing at least 50 kg
7. Mount Edgecombe soil sampler for fertiliser
8. White board: including white paper and dry wipe pens
9. Mayfield fertiliser applicator
10. Soil auger
11. SA Soil Classification (Blue Book) & SASRI Soils Book
12. Geological hammer
13. Measuring wheel
14. Tape measure
15. Camera
16. Farming Handbook (Barry Smith)
17. Access to mini runoff plots
18. Access to a stop watch



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