



NUUSBRIEF DESEMBER 2009 / NEWSLETTER DECEMBER 2009

*Christmas Message December 2009*

Dear Fellow SAIAE Members

This year has flow past and I was surprised when Luther (our business manager) requested me to write this end of year message. I am told that time passes more quickly as you get older and I can identify with that!

After a recent visit to Australia, I came back reflecting that South Africa is certainly an exciting and challenging place to live. There are many challenges that we cannot do much about, or can only influence in a small way. These include political uncertainty, corruption, crime, HIV/Aids, abuse of women and children, etc. However, there are other challenges such as food and water security in a variable and changing climate, developing economically viable sources of renewable energy, sustaining our natural environment, where we, as Agricultural Engineers, have a major role to play. The question we need to ask ourselves is: "Are we being as effective as we should be in addressing these issues" and, if not, why?

I was invited in September as a guest speaker at the SEAg (Australian Society for Engineers in Agriculture) 2009 conference, which is the Australian equivalent to SAIAE. I was surprised to find that SEAg has a membership approximately one-third of the membership of the SAIAE. This is probably linked to the number of Agricultural Engineering graduates from the University of Southern Queensland, which is the only university in Australia offering a degree in Agricultural Engineering, which has a graduate output which is currently much smaller than the graduate output from the University of KwaZulu-Natal. So relatively speaking, SAIAE should be a much more active and effective society, but is this really the case?

A valid question which SAIAE members may be asking is "What does the SAIAE do for me"? The broad mandate of the SAIAE is to "to serve and promote the Agricultural Engineering profession in South Africa". The constitution outlines the following activities for the SAIAE:

- Promotion and development of the science and technology of Agricultural Engineering.
- The promotion of the Agricultural Engineering profession.
- The promotion and encouragement of research and training in Agricultural Engineering.
- The distribution of knowledge, information and ideas by means of meetings and publications.
- The creation of meeting opportunities for Agricultural Engineers as well as for related technologists and technicians in South Africa.
- The creation of an organisation with authority to address Agricultural Engineering activities in South Africa and which can establish or recommend standards, norms and codes.

- The protection and promotion of the interests of the members of the profession and associated support for each other on technical and other matters.

As outlined in the October 2009 SAIAE Newsletter, the Council of the SAIAE has established a number of focus areas to address the above issues which we believe will serve and promote the Agricultural Engineering profession in South Africa. However, with the exception of Rika (part time secretary/administration/finances) and the relatively recently appointed part time Business Manager (Luther) all others in leadership positions (Council members, Branch Committees) serve the SAIAE in a voluntary capacity in addition to their normal jobs. Speaking from my personal experience, I know that this is not easy, and I appreciate all that does happen! So I encourage members not to only ask “What does SAIAE do for me” but more importantly to also ask “What can I do to contribute to SAIAE”, or in other words, “What can I do to serve and promote the Agricultural Engineering profession in South Africa”?

My challenge for 2010 to all our members is to get involved in the activities of the SAIAE and, if necessary, initiate new activities if you think that these are necessary. This may involve writing articles for our newsletters, participating in branch activities, making yourself available for leadership positions, giving Council feedback on activities you do like/do not like, or ideas for new activities which will help provide a better service for our members and which will grow our Institute! Council are focusing on the strategic focus areas summarised in the October 2009 SAIAE Newsletter, which I encourage you all to review again, and consider where you can make a contribution.

With much focus in South Africa on the World Cup Soccer Tournament in 2010, it is easy to wonder what is going to happen after 2010 in South Africa. I strongly believe that Agricultural Engineers, with our unique skills to meet the challenges associated with engineering within the environment and technology for food and energy production systems, will need to play a bigger and more active role in meeting these challenges and providing the necessary leadership.

I trust that you will carry these challenges through to your planning for 2010 and that you and your families have a wonderful, safe Christmas season and a happy, healthy and productive 2010 which includes contributing to a vibrant and growing SAIAE!

Jeff Smithers  
President

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### Wordingsjare van SAILI deur Felix Reinders

‘n Klein groepie landbou-ingenieurs wat sedert die dertigerjare van die vorige eeu aan die Universiteit van Pretoria afgestudeer het, was yl en wyd verspreid oor die hele Suid-Afrika. ‘n Mens sou kon sê: In die begin was die wêreld van die landbou-ingenieur woest en leeg – hulle was onbekend en onbemind. Daar was algemene wanopvattinge oor hierdie “nuwe soort” ingenieur, soos onder andere:

“Is jy werklik ‘n regte ingenieur?”

“Waar kry jy daardie snaakse graad? Ek het nog nooit daarvan gehoor nie”.

“O, jy is ook een van daardie kwasie-ingenieurs”.

“Wat doen ‘n landbou-ingenieur nou eintlik?”.

“’n Landbou-ingenieur – ek het nie geweet hulle word opgelei om te gaan boer nie”.

“Kan jy ook koeie melk?”.

“An engineer for agriculture – you must be joking!”.

“Why would we need an agricultural engineer? - a civil or mechanical engineer can do the work”.

Die vroeë landbou-ingenieurs moes te midde van sulke wanopvattinge en skerp verdraaiings hulself handhaaf deur op beperkte skaal “sendingwerk” te doen om die publiek, akademici, politici, en andere te probeer oortuig van hulle bestaansreg.

Een van die grootste struikelblokke op die weg na geregverdigde erkenning was die foutiewe opvatting dat ‘n Siviele ingenieur + ‘n Meganiese ingenieur = ‘n Landbou-ingenieur. Baie min mense het begryp en aanvaar dat die broodnodige ingenieursaspekte van die landboubedryf hoegenaamd nie in die leerplanne van die ander bekende ingenieursberoepes gefigureer het nie. Die landbou met sy omvattende natuurlike hulpbronne soos grond, water, klimaat, omgewing, plante, diere, energie, arbeid en finansies het die rolspelers met enorme leemtes gelaat wat paslik deur landbou-ingenieurs met entoesiasme en oorgawe gevul sou kon word.

Hoewel al hoe meer landbou-ingenieurs na 1950 naas die Universiteit van Pretoria ook aan die Universiteite van Natal en Stellenbosch opgelei is, het die vooroordele en wanopvattinge oor hulle beroep nie verdwyn nie – die STRYD om erkenning het steeds bly bestaan. Daar was ‘n STRYD om die ander ingenieursberoepes te oortuig van die landbou-ingenieur se geregverdigde onafhanklike bestaansreg. Daar was ‘n STRYD om landboumense soos vee- en akkerboukundiges en veeartse wat die totale landbouwerksweld vir hulleself toegeëin het, se koppe te draai dat hulle nie landbou-ingenieurs langer as onnodig en oorbodig sou beskou nie. Daar was ‘n STRYD om die wanbegrippe oor landbou-ingenieurs wat by die algemene publiek bestaan het te bestry. Daar was ‘n STRYD om voornemende studente oor die meriete van die goeie saak in te lig en hulle vir die landbou-ingenieursberoep te werf. Daarmee saam moes STRYD gevoer word om die nodige poste by universiteite geskep te kry vir die opleiding van landbou-ingenieurs.

Hierdie STRYDPUNTE het ‘n groepie landbou-ingenieurs aangespoor om bymekaar te bring wat bymekaar hoort deur die skepping van ‘n sentrale organisasie wat vir hulle as mondstuk kon dien en wat na hulle belange kon omsien.

Die behoefte is versterk deur toestande wat in Suid-Afrika ontwikkel het na afloop van die Tweede Wêreld-oorlog in 1945, toe omwentelinge in die Suid-Afrikaanse landbou positiewe gevolge vir landbou-ingenieurswese gehad het. Groot skaalse aanvaarding en toepassing van meganisasie, besproeiing, plaaselektifikasie, grondbewaring, dierebehuising en ander landboustrukture het die dienste van landbou-ingenieurs benodig. Hierdie revolusie op plase het onbekende probleme vir boere geskep en groot geldelike verliese meegebring weens ‘n gebrek aan, onder andere, kennis van meganisasie en waterbenutting. In menige opsigte was dit ingenieurskennis wat nodig was. Die destydse regering en die Departement van Landbou Tegniese Dienste het hierdie behoeftes as uitdagings aanvaar met die totstandkoming van die Afdeling Landboumeganisasie en –ingenieurswese in 1961.

Alhoewel landbou-ingenieurs voor die skepping van ‘n spesifieke landbou-ingenieursafdeling in die Departement in 1961 op beperkte maar verspreide skaal deur die hele Suid-Afrika by grondbewaringsprojekte betrokke was, het landbou-ingenieurs nou vir die eerste keer met hulle kundigheid voldoen aan die vraag na professionele dienste op ‘n veel meer uitgebreide skaal en kon hulle optree op die wyer werksterreine wat landboumeganisasie, besproeiing, landbougeboue en

–strukture insluit. Nou kon hulle deur hulle werk en prestasies bewyse lewer om hulle bestaansreg te regverdig.

In die vroeë sestigerjare van die vorige eeu het van die toonaangewende landbou-ingenieurs begin besef dat die tyd ryp geword het om ‘n verteenwoordigende liggaam of instituut op professionele vlak te stig wat onder andere die volgende doelwitte sou hê:

1. om alle landbou-ingenieurs in Suid-Afrika deur individuele lidmaatskap saam te voeg in een professionele tuiste en om as amptelike spreekbuis vir hulle op te tree;
2. om in die lig van inisiatiewe wat in die wye ingenieurskring aan die gang was vir die totstandkoming van ‘n statutêre beroepsliggaam vir professionele ingenieurs, ook vir landbou-ingenieurs erkenning en ‘n plek onder die son te verkry. In hierdie verband was dit dringend noodsaaklik dat landbou-ingenieurs lidmaatskap van die toenmalige Federasie van Verenigings vir Professionele Ingenieurs (FVPI), die “Professional Engineers Joint Council” (PEJC), die Skaduraad vir Suid-Afrikaanse Professionele Ingenieurs en dan later die statutêre Suid-Afrikaanse Raad vir Professionele Ingenieurs (SARPI) moes verkry;
3. om erkenning vir universiteite se kurrikulums in landbou-ingenieurswese by SARPI te verkry sodat pas-gegraduateerdes as ingenieurs-in-opleiding kan registreer;
4. om die landbou-ingenieursberoep op alle terreine te bevorder soos deur kursusse, simposiums, vergaderings, publikasies en publisiteit;
5. om in besonder voorgraadse- en nagraadse studente vir die studierigting te werf en met beurse te ondersteun; en
6. om universiteite en teknikons wat kursusse in landbou-ingenieurswese aanbied, te ondersteun.

Erkenning moet gegee word aan wyle Prof. P J C (Piet) Vorster wat met hierdie doelwitte voor oë ‘n konsep-grondwet vir die voorgestelde Instituut van Landbou-ingenieurs opgestel het. Dit was die vertrekpunt waarvandaan SAILI tot stand kon kom. Onder sy voorsitterskap is daar ‘n vergadering om 5-uur die middag van 11 November 1963 in die Culemborg Hotel in Pretoriusstraat, Pretoria gereël. Die doel van die vergadering was uitsluitlik om te besin oor die stigting van ‘n Instituut vir Landbou-ingenieurs. Uitnodigings om die vergadering by te woon is op persoonlike basis aan landbou-ingenieurs uit verskillende werksterreine gerig. Vier-en-veertig persone het die geleentheid bygewoon. Ten spyte van sporadiese teenkanting van ‘n paar lede van EASA (Engineers Assosiation of South Africa) is die voorstel om tot die stigting van ‘n Suid-Afrikaanse Instituut van Landbou-ingenieurs oor te gaan met ‘n oorweldigende meerderheid aanvaar. By die geleentheid is die lede van die eerste Raad van SAILI benoem en die eerste Raadsvergadering onder leiding van die President, Prof Piet Vorster, is op 11 Februarie 1964 by die Universiteit van Natal te Pietermaritzburg gehou.

So het SAILI se wiele begin rol – en net betyds want gedurende die jare 1966 – 1968 het die voorbereidende aksies momentum begin kry vir die totstandkoming van die statutêre Suid-Afrikaanse Raad vir Professionele Ingenieurs (SARPI). Toe die Statutêre Raad in 1969 gestig is, was die landbou-ingenieurs se huis in orde en kon hulle hul regmatige plek in die forum van erkende institute vir professionele ingenieurs inneem.

Die landbou-ingenieursprofessie mag nooit die tydigse inisiatiewe en versindheid van SAILI se stigterslede vergeet nie. Ons kan vandag met dankbaarheid terugkyk na die Instituut se aksies en sukses oor 40 jaar.

# Design Projects by 2009 Final Year Agricultural Engineering Students in the School of Bioresources Engineering at the University of KwaZulu-Natal

by

Prof JC Smithers and Mr LF Lagrange

## Design Projects

Six design projects were undertaken by the 2009 final year Agricultural Engineering students in the School of Bioresources Engineering at the University of KwaZulu-Natal.

The first project, undertaken by Alaika Kassim and Samantha Moodley designed and evaluated a probe for measuring the Eh and pH of unsaturated soils. The main objective of the project was to be able to continuously measure the pH, Eh (redox) and temperature of an unsaturated soil medium and the total cost of the probe could not exceed R3000. After considering available commercial probes and alternative solutions, the project team designed a probe comprising of pH, Eh and temperature sensors located within a PVC and ceramic body with a total length of 1.0 m length and a diameter 0.025 m, as shown schematically in Figure 1. The performance of the pH meter was found to deteriorate with time as the ceramic did not create an adequate selective barrier which resulted in interactions between reference and pH electrodes and the use of a ceramic with a higher pressure was recommend for future designs. Tests of Eh measurements showed that the Eh sensor was able to adequately assess the aeration condition of the soil and the thermocouple was found to measure temperature adequately.

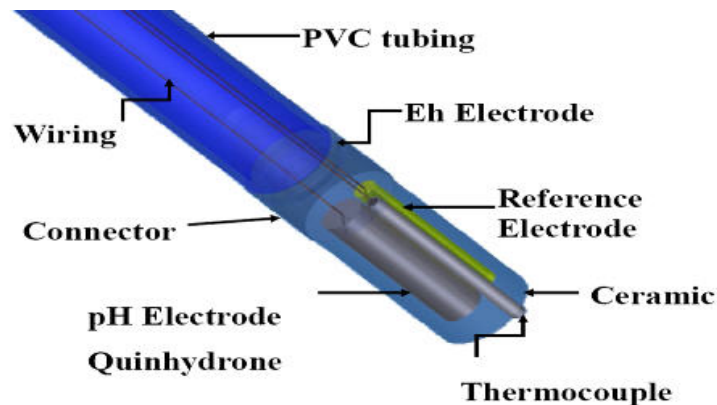


Figure 1: Schematic diagram of pH, Eh and temperature probe

Gordon Boote and Thabo Mavundza designed, constructed and evaluated an automated four way sheep sorter. The project was funded by the Institute of Agricultural Engineering at the Agricultural Research Council and formed part of a larger project to demonstrate the advantages of Radio Frequency Identification (RFID) and automatic goat and sheep handling systems. Field testing of the pneumatically operated gates controlled by a PLC was conducted as shown in Figure 2 and the theoretical sorting rate of approximately 860 sheep per hour exceeds commercially available sorters.



Figure 2: Evaluation of automatic sheep sorter

The third design project was undertaken by Nkosinathi Nsele and Nhlanhla Ngcamu who designed, constructed and evaluated drip and furrow irrigation models to aid teaching irrigation principles. The objectives were to demonstrate Bernoulli's equation, the hydraulic characteristics of drippers, dripper water distribution patterns and the impacts of slope, soil type, cut-off time and application rate of furrow irrigation. The wetting pattern of drip and furrow irrigation in sand and clay soils are evident in Figure 3 and 4 respectively.



Figure 3: Wetting pattern of drip irrigation in clay and sand soils



Figure 4: Wetting pattern of furrow irrigation in sand and clay soils

Yvonne Molepo and Gladys Lebotsa designed a sprinkler irrigation system for the Masivusane Community Garden. The design included an assessment of the available water quantity and quality, determining an optimum combination of crops and the crop water demand, conducting a topographic survey to produce a contour map, soil sampling and laboratory analyses to determine the soil texture, system layout, hydraulic design, scheduling plan and economic analyses. Once the design was completed, the performance of a similar irrigation system was determined. Some activities performed by the students are shown in Figure 5.



Figure 5: Activities undertaken as part of the field irrigation design

Albert Motloun and Mahlatse Mamabolo designed, constructed and evaluated a biogas digester unit which utilises a hydraulic pressure balancing valve to promote mixing within two chambers using the pressure of the biogas within the chambers to mix the slurry and thus speed up bacterial growth. A schematic diagram and the constructed unit are shown in Figure 6. Laboratory analysis of the hydraulic valve, inset in Figure 6, was found to perform satisfactory. Slow bacterial growth and biogas production prevented the unit from being fully evaluated.

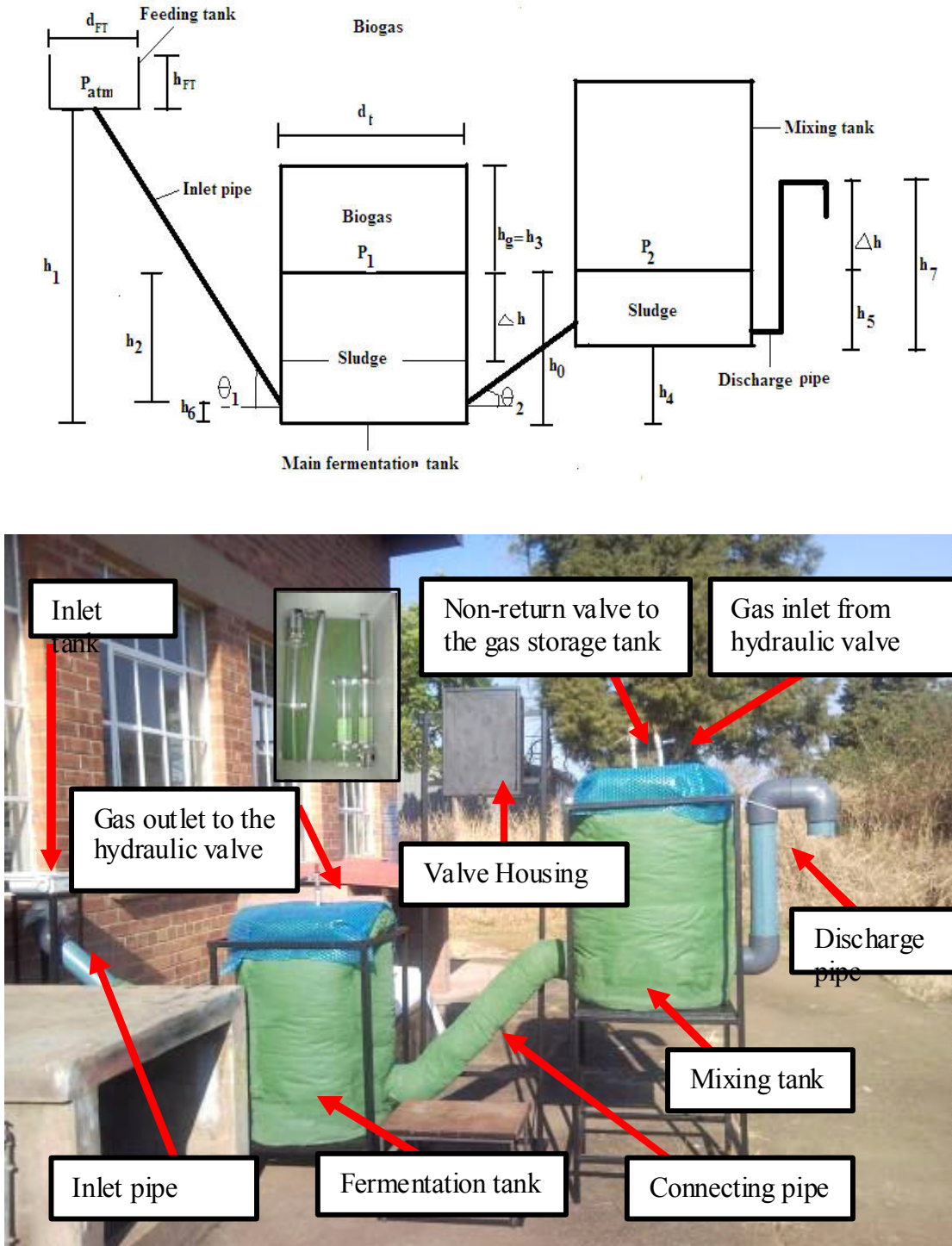


Figure 6: Schematic diagram and constructed digester and hydraulic valve (inset).

Dumisani Sibuyi designed, constructed and evaluated a selective herbicide applicator, as shown in Figure 7, where the client wanted the rope wicks to selectively apply herbicide to taller vegetation ranging in height from 150 to 500 mm. Initial testing of the applicator indicated that it effectively applied herbicide to taller vegetation.



Figure 7: Selective herbicide applicator

### Awards

The SAIAE Council provides incentive and recognition awards for students who perform well academically. The following awards were made to Agricultural Engineering students at UKZN for excellent academic performance in 2009:

- First Year: Tshifhiwa Ramakapola
- Second Year: Setsembile Dlamini
- Third Year: Gordon Boote
- The SAIAE Bronze medal award for the best graduate in 2009: Thandeka Meyiwa, shown receiving her award in fig 8



Figure 8: Thandeka Meyiwa receives the best graduate award in 2009 from Prof Jeff Smithers (President of SAIAE)

The automated four way sheep sorter projected project was selected by the examiners as the best final year design project for 2009 and Gordon Boote and Thabo Mavunza received both the MBB Consulting Engineers Prize and the SAIAE Floating Shield for the best design project (Figure 9).



Figure 9: Mr Alick Rennie (MBB Consulting Engineers), Gordon Boote and Thabo Mavunza (best final year design project) and Prof Jeff Smithers (SAIAE President)

Samantha Moodley was awarded the best workshop practice prize sponsored by Gedore Tools (SA) and Mr Alan Hill made the award to Samantha on behalf of the sponsor (Figure 10).



Figure 10: Samantha Moodley receives the Gedore Tools best work practice award from Mr Alan Hill

### Acknowledgements

The following financial and other contributions made to the design projects are gratefully acknowledged:

- Institute of Agricultural Engineering, Agricultural Research Council – Prof Timothy Simelanga
- Grassland Science at UKZN - Prof Kevin Kirkman
- RG Burton Controls – Mr Ricky Dayanand
- Dr Colin Southway and Mr M Somaru – Chemistry at UKZN
- Mr V Dorasamy - Soil Science at UKZN
- Troy Manufacturing
- Dr George Tivchev
- Mr Francois Cilliers

Mr Richard Robertson from MBB Consulting Engineers and the SAIAE are thanked for making available awards for the best design project. Mr Herman Schmitz from Gedore Tools (SA) is also thanked for providing a prize to the student with the best workshop practice. The food and drink at the KZN-SAIAE branch meeting, where the students presented their projects, was sponsored by LRI (Mr James Brodie) and LIMA (Mr Duncan Stewart), who are both thanked for this generous contribution.

## SAIAE MEETINGS - 2010 / SAILI VERGADERINGS - 2010

Members in the different regions are requested to diaries the following dates pertaining to meetings to be held during 2010. Venues and other details will be announced latter. Should the dates change, members will be notified accordingly.

Lede word hiermee versoek om asb die volgende datums in hulle dagboeke aan te teken as die datums waarop die verskillende vergaderings gehou sal word. Die tyd en lokaal sal tegelegenertyd bekend gemaak word. Indien enige van die datums sou verander, sal lede dienooreenkomstig ingelig word.

### *BRANCH MEETINGS / TAKVERGADERINGS*

#### **Kwazulu - Natal Branch / Tak**

Tuesday 2 March 2010

Tuesday 4 May 2010

Tuesday 3 August 2010

Wednesday 27 October 2010

#### **Pretoria Tak / Branch**

9 Februarie 2010

6 Mei 2010

5 Augustus 2010

14 Oktober 2010

#### **Western Cape Branch / Wes Kaap Tak**

During the week 15 - 19 March 2010

During the week 11 - 15 October 2010.

### *SAIAE COUNCIL MEETINGS / SAILI RAADSVERGADERINGS*

10 Februarie 2010

27 Oktober 2010

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#### **URGENT REQUEST TO ALL MEMBERS:**

- (i) To be able to keep the member database up to date and correct – which will aid in the dissemination of information to members – each member is requested to please email their name, contact telephone number (office and cell) and correct e-mail address to Luther Siebert at [mls@iafrica.com](mailto:mls@iafrica.com). (Any other information, e.g., ID number, postal address, present employer, etc will appreciated.) To those who have already submitted the above a word of thanks.
- (ii) All members are invited to send news items, agricultural activities in their regions and other relevant information to the e-mail address above.

- (iii) To be able to produce a newsletter of interest to the members, a request is made to all members to please submit articles about their present field of work or interest of between 1000 – 1500 words for publication. Please send such articles to the above e-mail address.

#### DRINGENDE VERSOEK AAN ALLE LEDE:

- (i) Om die databasis van die lede korrek en op datum te hou, word lede versoek om asb hulle naam, kontak foon-nommer (beide kantoor en selnummer) en korrekte email-adres te e-pos na Luther Siebert by [mls@iafrica.com](mailto:mls@iafrica.com). Bogenoemde inligting sal verseker dat die verspreiding van inligting korrek plaasvind en die lede bereik. (Enige bykomende inligting bv ID-nommer, posadres, huidige werkgewer, ens sal waardeer word.) Lede wat reeds bogenoemde inligting deur gestuur het word bedank vir hulle samewerking.
- (ii) Alle lede word vriendelik versoek om enige nuusgebeure, gebeurtenisse mbt die landbou en ander inligting deur te stuur na bogenoemde e-pos adres vir verdere verspreiding.
- (iii) Om instaat te wees om 'n nuusbrief saam te stel wat die aktiviteite van SAILI se lede weer gee, word n vriendelike versoek aan alle lede gerig om artikels in te stuur waarin die lid se huidige werks aktiviteite of belangstellings velde uitgebeeld word. Stuur asb sodanige artikels [lengte van artikels - 1000 - 1500 woorde] na bogenoemde e-pos adres.