SALLnet Newsletter, July 2021

Dear SALLnet members,

We have to share some good news: First, **SALLnet's proposal for extension has been accepted and SALLnet will be provided additional funds, so that we will be able to continue our work until 31 July 2022 and above all to accomplish our tasks**. Thank you very much to everybody who has been involved into proposal writing and who has contributed to our project, so that we were able to convince our funders!
Second, we are now able to announce our next **Annual Meeting**, which will be held online on **22 and 23 September 2021**. Further information will be circulated soon.
Third, there will be a change in **SALLnet's coordination**. Doris Boden will leave SALLnet by end of July and Thomas Bringhenti will take over in August. Thomas is member of SALLnet's work package 5, why he knows SALLnet very well. We wish Thomas a good start!

Apart from that this newsletter is focusing on field and research activities conducted recently in SALLnet to keep you updated on the project. The current issue contains information on SALLnet related to:

Field Work
Upcoming Events

Field Work

SALLnet focuses on how the resilience of the multi-functional landscapes in southern Africa can be enhanced. To do so, we are developing and testing new approaches and methods for more sustainable land-use, with a focus on the interactions between the connected land-use types: **arable lands, rangelands and tree orchards**.
The current issue contains contributions on arable lands by work package (WP) 1, on macadamia orchards by WP 5 and on the socio-economic aspects of farming by WP 4.

Winter cover crops experiment resumed in Limpopo: WP 1

Field experimentation on C3 cover crops were planned as part of WP 1 activities for 2 years and two distinct sites in

Limpopo (Thohoyandou, Syferkuil). Covid19 restrictions prevented the accomplishment of this task in the 2020 season. Nevertheless, in collaboration with the South African partners the experiment resumed for the winter season (June 2021) at both sites. Lead research assistants Mr. Kabisheng Mabitsela (University of Limpopo) and Mr. Segolo Phasha (University of Venda) are in charge of the experiment and timely data collection, remotely coordinated by PhD student Sala Lamega (University of Goettingen). The experiments plots were 3m x 2m and set up in a randomised complete block design with four replications at each site and two sowing dates (early, late). The C3 species selected for the trials are as follows: hairy vetch (Vicia villosa L.), Egyptian clover (Trifolium alexandrium), winter rapeseed (Brassica napus L.), and winter rye (Secale cereale). The data will serve to setup, calibrate and evaluate crop models for modelling exercises on forage intensification for feed gaps risk mitigation and farm productivity.

Field trial at Syferkuil (top), and at Thohoyandou (left). Photos: Kabisheng Mabitsela, Segolo Phasha.

A drought simulation experiment for macadamia trees: WP 5

One of the main focuses of SALLnet's WP 5 ("Effect of climate change and management interventions on ecosystem services of arable land and macadamia orchards in Limpopo region") is on macadamia trees water use dynamics. Alongside intensive experiments aimed at monitoring macadamia tree transpiration, phenology and productivity over two years, PhD student Thomas Bringhenti started a drought simulation experiment, with the support of colleagues from both the University of Goettingen and the University of Venda.

Aim of this study is to understand the response of macadamia trees to an induced drought in Limpopo, South Africa. Limpopo has been affected in recent years by severe droughts related to ENSO. Furthermore, this region is characterized by unevenly distributed annual rainfalls, rarely exceeding 1,000 mm. As a consequence, macadamia trees require supplementary irrigation for good yields and optimal nut quality. Nevertheless, concerns are rising about the future availability of water resources for irrigation in the area, due to decreasing rainfall amounts (IPCC 2007) and depleting groundwater levels (Makungo et al., 2017). Thus, it becomes of utmost importance to understand how a prolonged drought would affect adult macadamia trees, and in particular to determine the critical level of soil moisture beyond which trees exhibit water limitations through reduced daily transpiration and water use.

To this purpose, a simulated throughfall-exclusion experiment was implemented on two orchards (one with HAES 849, the other with Beaumont macadamia cultivars) at Neuhof farm in Limpopo. In each orchard, 3 trees were excluded from irrigation and plastic covers were placed over roof-like structures under the trees' canopies, in order to prevent throughfall (the rain that would normally reach the ground after passing through the tree canopy) from infiltrating into the soil. Other 3 trees in each orchard were selected as controls and received a weekly total irrigation of 210 liters per tree over 2 applications. Weather parameters (rainfall amounts, temperature, air humidity, solar radiation and wind speed) and soil moisture are continuously monitored in both orchards. Furthermore, sap flux density (a measure of tree transpiration) is also continuously measured for all selected trees by means of Granier sap flow sensors. Daily tree water use amounts were calculated by summing up hourly transpiration over daytime period.

Above: Building of structures supporting throughfall-exclusion plastic covers under macadamia trees at Neuhof farm in Limpopo, March 2021. Photos: Thomas Bringhenti

Preliminary results show a clear decrease of soil water content under the treated trees compared to the controls, after less than two months from the start of the experiment. We expect that such decrease will in turn lead to a considerable reduction in transpiration and water use of macadamia trees. The acquired knowledge on the soil moisture threshold beyond which tree transpiration is reduced will help to accordingly adjust the irrigation management under drought conditions and limited water availability.

Developing farm type specific and spatially explicit risk management options: WP 4

The main aim of the SALLnet's WP 4 (Economic modelling) is to investigate the effects of present and future agri-relevant risks on the production activities and the economic performance of different farm types in the Limpopo region of South Africa. In this regard, the first step was to conduct surveys from small-scale and large-scale farmers in the Limpopo province to understand the status quo of the agricultural sector with regard to farm structures, farm types, land-use options, agri-relevant risks, risk exposure and risk management options of farms.

For the small-scale farmers survey, five study areas were selected from Limpopo province based on their climatic aridity differences, demography and socioeconomic factors. The selected sites were located in rural areas in the Mopani district: Mafarana, Gavaza, Ga-Selwana, Makushane, and Ndengeza. Farming systems in these areas were mainly small holder farmers with limited resource endowments. In February 2019, the target villages were visited for the first time with main members of the research group, including professors, PhD and master students from the University of Goettingen in Germany and Universities of Limpopo and Venda in South Africa. The aim of this visit was to introduce and explain the main objectives of the research project to local farmers, to have group discussions between the research group and smallholder farmers and extension officers, and to ask for the permission from tribal authorities of each village to access farmers for conducting a survey.

Figures: SALLnet researchers, Sara Yazdan-bakhsh and Hannah Redders, interviewing farmers and further community members in Ndengeza and Ge-Selwana supported by translators (top), and a farmer's family expresses their joy about their participation in the research in Ga-Selwane (right) – both in June and July 2019. Photos: Hannah Redders, Sara Yazdan-bakhsh

After pre-testing the questionnaire from some random farm households in the selected regions, a structured questionnaire was conducted to interview in person with the farmers in order to collect information on socioeconomic, demographic, farm and household characteristics, as well input and output data of the agricultural production during the 2018-19 cropping seasons. Respondents were the household heads or the persons in position to make decisions on recourse allocation on farming activities and their household food security. The data collection was carried out between March till July 2019. Using a purposive random sampling procedure, data were collected from 215 smallholder farmers across the five selected villages in Limpopo. Translations between English and local languages (Tsonga, Pedi, Venda) were conducted by the student assistants from the Universities of Limpopo and Venda and by some local farmers. All the data collection processes were organized by prof. Ayisi and his group members from University of Limpopo.

The main students who assisted in collecting data are:
Carlotta May, Felix Hegeler, Hannah Redders: Master students at University of Goettingen
Lesly Nembudani: University of Venda
Frederick Shokane, Mimmie, Frank Makhomisane: Local farmers
Sara Yazdan-bakhsh: PhD student and research associate at University of Goettingen

For the large-scale commercial farmers which are mainly avocado and macadamia farmers, after group discussion between research group and farmers in February, structured surveys were sent online to farmers in October 2019.
Based on these surveys, biophysical results from other subprojects as well as on extended stakeholder engagements, the main tasks of this subproject are as follows:

- Developing the farm type specific and spatially explicit risk management options regarding their effectiveness under different land use management and policy scenarios
- Investigating how efficient different farm types in Limpopo are and to what degree the presence of agri-relevant risks is the reason for potential deviations from their efficiency optimum

- Developing risk management options to support farmers in improving their long-term efficiency and/or resilience under different land use management scenarios
- Modelling the long-term agricultural development in the Limpopo region under explicit consideration of competition, agri-relevant risks and different policy options both at farm and regional level (ABM).

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Upcoming SALLnet Events

SALLnet's 3rd Annual Meeting, online

22–23 September 2021
SALLnet's 3rd Annual Meeting serves to facilitate exchange between our researchers, work packages and subprojects and to get in contact with our stakeholders to present and evaluate preliminary research results.

A draft program is to be found here. Further information will be provided to you in due course.

Further Upcoming Events

Grassland Society of Southern Africa: 56th Congress

26–30 July 2021
GSSA 56th Congress
Surval Boutique Olive Estate, Oudtshoorn

Further information please find here.

Tropentag 2021, hybrid

15–17 September 2021
Towards shifting paradigms in agriculture for a healthy and sustainable future
University of Hohenheim, Germany

Further information please find here.

Landscape 2021: Diversity for Sustainable and Resilient Agriculture, online

20–22 September 2021
Landscape 2021 will bring together scientists from across disciplines with key actors to explore whether and how diversity and diversification can contribute to a more sustainable and resilient agriculture.

Further information please find here.

International Congress of Zoology, online

22–24 November 2021
Zoology in the Anthropocene – a Holistic Integrated Approach to Conservation

Further information please find here.

4ᵗʰ Agriculture and Climate Change Conference

7-9 May 2023
Dresden, Germany
Deadline for submission of abstracts: **11 November 2022**

Further information please find here.

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Information on SALLnet are as well to be found on our Website and on our Google Drive. Access to the Google Drive will be granted to everyone using the links implemented into this document. The Google Drive can as well be accessed via the link Project Documentation on our website for those of you who are registered. To register please send your google address to SALLnet's coordinator.
We also recommend to visit the SPACES II website, where all capacity building courses of SALLnet and the entire SPACES II programme are announced (with access to the application tool).

SALLnet – South African Limpopo Landscapes Network

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