



DEPARTMENT OF AGRICULTURAL RESEARCH

The investigator, the light
in the farming zone

VOLUME 6, ISSUE 1

www.agricresearch.org.ls

JUNE 2022



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1. MESSAGE FROM THE DIRECTOR OF AGRICULTURAL RESEARCH

The Department of Agricultural Research (DAR) is happy to share with you our valued stakeholders this issue of our latest newsletter. This issue is mainly on activities that were undertaken under the APPSA Project; these being farmer field days and trainings of different groups. The importance of sensitizing farmers and other stakeholders on dangers of brown locusts is also highlighted. As usual, we hope that you will learn something from this issue and we welcome your constructive comments.

Dr Lefulesele Lebesa

2. DEPARTMENT OF AGRICULTURAL RESEARCH SURVEILLANCE ON BROWN LOCUST SUSPECTED OUTBREAK IN LESOTHO AND POSSIBLE EARLY WARNING MEASURES

Introduction

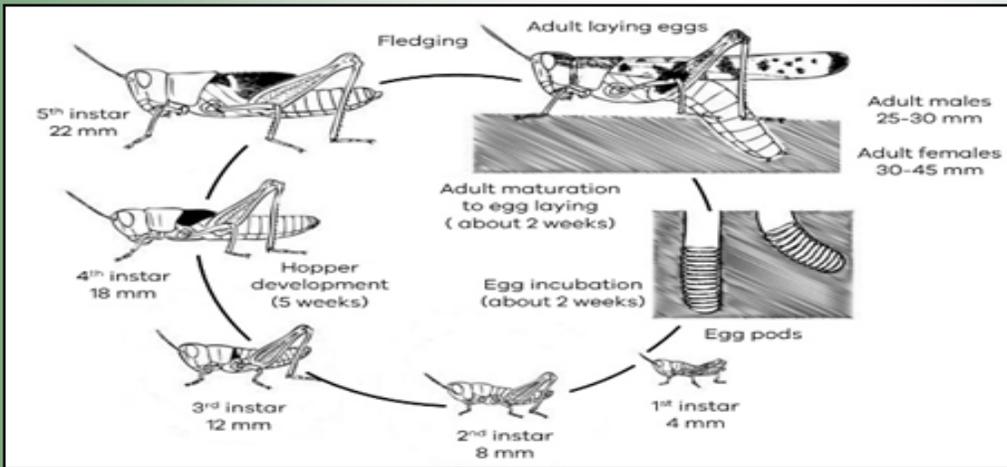
The brown locust (*Locustana pardalina*) is a major agricultural pest found in Southern Africa Region. It is described as the most important agricultural pest that could lead to a serious economic impact through high crop losses during outbreak. Recent brown locust outbreak was reported in Republic of South Africa (RSA) with Western Cape, Northern Cape, Eastern Cape and Free State provinces regarded as hotspot areas. This calls for Lesotho as a land locked by RSA to have clear national preparedness plan through use of surveillance

mechanisms to ensure that any suspicious case is attended to where locust can be spotted and be identified by the Department of Agricultural Research (DAR) to ensure that the locust is identified as brown or not. The objective of the surveillance came through after the report from Mapoteng, Popopo, Berea district of suspicious locust case. The locusts were spotted and sampled and inspected in Entomology laboratory at DAR. Physical inspection of the effects inflicted on the crop was done as depicted in Figure 2c. The analysis results

would inform on the plans for short-term control and long-lasting mitigation measures for possible outbreak.

Description of brown locust

Brown locusts are medium-sized insects belonging to monotypic genus *Locustana* (Todd et al, 2002). The two known forms of the brown locust include the *gregaria* (living in flocks) and migratory form, with a body length of 41–51 mm. This locust can change colour from yellowish grey to yellow when sexually mature. The life cycle of brown locust has stages: eggs laying,



-1-177007-061-5), the collected grasshopper was identified as elegant grasshopper *Zonocerus elegans*, the family *Pyrgomorphidae*. The elegant grasshopper is native to Africa and capable of eating just about anything planted in the garden. Its distribution is restricted to the southern parts of Africa and *Zonocerus elegans* is a major pest of crops.

Elegant grasshopper adults can grow between 4 and 5 cm and appear with bright colour with black, blue, red, yellow and orange horizontal bands spanning the length of the

Fig. 2a: Locust life cycle

hatching, hopping (1st -5th nymphal instars) and adulthood. Brown locust eggs are drought-tolerant with short life cycle of 2–4 generations per year. Eggs are usually laid in dry soil during the summer months and hatch 10 days after rain has fallen. Under drought conditions, eggs can remain viable for up to 3 years. After the rain has fallen, the swarming population will hatch and often lives until another dry season. Since they have drought-tolerant egg stage, short life cycle, highly productive and gregarious behaviour, the brown locusts are characterized as economically important with possibility of high crop losses during an outbreak. Although is not easy to plan anti-locust campaigns before outbreak, use of insecticides over large areas during swarming phase could reduce outbreaks.

Methodology and outcomes of surveillance

Locusts have been identified as the oldest migratory pests and among the most devastating pests worldwide with brown locust being reported in RSA and is among the main migratory pests in Southern Africa Region. There is a serious impact in

terms of the damage on the environment and crop production caused by this locust. Work by Food and Agriculture Organization (FAO) (2006) and Zhang et al. (2019) shows that locusts can lead to 80- 100% production losses in cereals, while for leguminous crops, losses range between 85% and 90% of the expected crop production. Thus, after report of suspected case of locust in swamp, the samples were collected by extension workers and caged in green collapsible insect cage mesh (Figure 2d) at the DAR before identification. The follow up visit to infested farm was done whereby the coordinates were captured: S 29°06'.011; E 27°57'.572 using Garmin, Montana 680. The pictures were also captured using Canon EOS 4000D (Figure 2b). The area is in Mapoteng and is a subsistence farm of less than an acre but 5 X 8 meters maize plot. During the visit, the crop was already fumigated with cypermethrin, although the surrounding area was still infested. During identification at DAR using reference book (Field Guide to insect of South Africa-ISBN:978



Fig. 2c: Impact of locust on maize

abdomen. The hind legs are enlarged allowing them to jump long distances.

The immature elegans (nymphs) appear like adults but are smaller in size and less noticeable. They tend to aggregate on the host plant to feed. They are flightless, possessing wing buds only. These grasshoppers may graze on the fruits of plants and may cause some die back in the plants affected. Insect excretion may be evident over the leaves of plant. Notches, holes and bites may also be seen from leaves of plants. These grasshoppers, sometimes, attack the seeds of plants too with heavy infestations resulting into plant death.



Fig. 2b: Locust invading farms and damages on crops

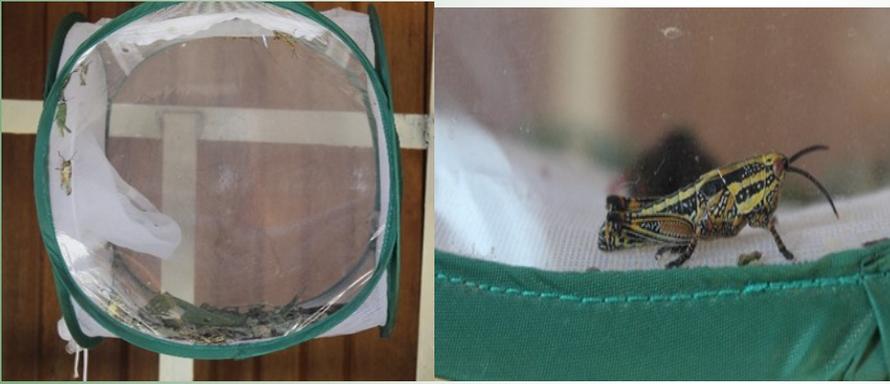


Fig. 2d: Caged locusts

Intervention measures

Chemical was used whereby the farmer under guidance of extension officer was provided with cypermethrin from the DAR Plant protection and Quarantine (PPQ) to spray on infested plot in order to reduce further multiplication of Elegant Grasshopper.

The disadvantage of cypermethrin as active ingredient is long persistence into the environment.

Other recommended controls

The grasshopper nymphs can sometimes be the most damaging. They tend to feed gregariously (in large numbers, all at once).

It is advised to check garden plants regularly during warm and after rainy seasons to catch elegant grasshopper before the problem becomes irreversible. Regular weeding in the garden can make the space less attractive to grasshoppers. Scarifying the soil can turn up overwintering egg pods. This

should be done in late winter and early spring because the eggs are due to hatch in spring.

Elegant grasshoppers dislike vegetables: Tomatoes, Squash and Peas, therefore crop rotation is recommended between vegetables with maize. Elegant grasshoppers prefer long grasses that they can hide in. Garlic and other odour repellents spraying is understood to prevent elegant grasshoppers and can be applied as soon as the problem is detected. Hot pepper spray is an alternative to the above. It is distasteful to herbivorous insects like elegant grasshoppers. Slightly more abrasive is neem oil. It is more environmentally friendly than synthetic pesticides. Neem treatments with correct concentration can be effective for prevention.

Insecticidal soaps can also replicate similar results to neem; by diluting a vegetable oil and dishwasher soap with water.

Conclusion

Popopo in Mapoteng found infested with locust as and should be mapped out with regular survey and monitoring to allow

control of the locusts early enough before they invade other areas and become difficult to control. There should be effective locust control strategy in areas where there is possibility of seasonal breeding e.g. areas around Mapoteng R.C. and nearby grassland. This can reduce the risk of future outbreaks and upsurges through the timely detection of a pre-emergency situation.

Recommendations

Possible interventions include that Lesotho should map out the seasonal breeding areas of the elegant grasshopper and possible brown locust hotspots. This means engaging all role players; Department of Crops (DOC), DAR, Lesotho Agricultural College (LAC), Department of Environment and National University of Lesotho (NUL). for better understanding of the locust's life cycle, breeding behaviour as well as the geography of the affected areas and other possible areas at risks of infestation. Lesotho should develop an implementable and effective locust control strategy largely informed by the role players. The strategy should include: the capacity building aspect for village/community nearby the borders and infested areas and phytosanitary measures in place. In case of serious outbreak, there is a need to use chemical control measures to contain the locust before next egg laying cycle stage.

Use of border agencies at port of entries and extension workers for close monitoring can enhance borders and inland surveillance through capacity building of personnel training for identification of any locust or grasshopper that may be in swamp

By: Mosunkuthu Khabisi

3. AGRICULTURE PRODUCTIVITY PROGRAMME FOR SOUTHERN AFRICA-LESOTHO HELD A WORKSHOP FOR RESEARCH TECHNICAL OFFICERS AND REASERCH FIELD ATTENDANTS

Agricultural Productivity Programme for Southern Africa (APPSA) is six (6)-year World Bank funded project which seeks to promote a regional approach to agricultural technology generation and dissemination by supporting, strengthening and scaling up Regional Centres of Leadership on commodities of regional importance. Lesotho has established a Regional Centre of Leadership

(RCoL) on horticulture and horticulture-based farming systems.

Through APPSA, the Research Technical Officers (RTOs) and Research Field Attendants (RFAs) were capacitated on trial management in a three-day workshop as they assist scientists in this activity. The first day was meant for RTOs and the second day for RFAs while the third day was field practical work for both groups.

The RCoL coordinator Ms Monica Lephole

expressed satisfaction during her opening remarks that the long overdue workshop was finally conducted. She indicated that RTOs and RFAs play a critical role in research activities particularly in managing trials and demonstrations. She highlighted that without skilled RTOs and RFAs scientists would not conduct research trials with ease hence, the importance of constant trainings. She pleaded with the participants to carry out their duties seriously to avoid faulty research findings.



Fig. 3a: Participants during the workshop deliberations

The participants were refreshed on public Trial design and layout; soil sampling service act and code of good conduct at and fertilizer description; basic crop work place by the Human Resource Officer. husbandry; basic plant health and

protection as well as field safety measures were included in the training package for the participants. Eight (8) RTOs and twenty-five (25) RFAs were trained in this workshop.

Mr Teboho Lekhema on behalf of the participants expressed his gratitude to APPSA-Lesotho for considering both RTOs and RFAs for this training. He highlighted that there was a training need for the recently recruited officers and refresher trainings for those that have been in the work environment for some time. He indicated that the training was insightful hence, the participants are in a position to execute their duties with ease. He pleaded with the participants to double their efforts in ensuring successful research undertakings.

By: Lefutso Ramokoatsi



Fig. 3b: Participants during the field practical

4. APPSA-LESOTHO HOLDS A FIELD DAY ON VARIOUS CROPS IN MOHALE'S HOEK DISTRICT

APPSA-Lesotho is a regional project implemented by the Department of Agricultural Research (DAR) in partnership with the National University of Lesotho (NUL) and Lesotho Agricultural College (LAC). The a field day was held under APPSA and showcased trials on four commodities being beans, sorghum, peach trees and potatoes on the 23rd March 2022.

Lesotho is establishing a Regional Center of Leadership (RCoL) in horticulture farming system. This is a world bank funded initiative for agricultural research in Southern Africa as Agriculture Productivity Programme for Southern Africa (APPSA). Component one of APPSA stipulates that generated agricultural technologies should be disseminated to the end users who in

the context of APPSA are farmers. Field day is one of the approaches used to disseminate and/or promote technologies generated.

A field day is an educational event held on-farm or on research station. It is organized and hosted by the scientists, often-times in collaboration with agricultural extension agents. The event usually includes

demonstrations of specific management practices and highlight research methods, varietal performance and results. The speeches and other activities focus on a central theme strung out over the course of the day to promote or call attention to new practices or crop varieties and ex-



Fig. 4a: Sorghum demonstration

citing developments in agriculture.

Sorghum demonstration under sub-project “Strengthening the sorghum seed delivery systems in Lesotho and Angola” is led by Dr Mpho Liphoto. Sorghum landraces were collected country wide and screening of good traits is being conducted. The intention is to study the features of sorghum landraces and tolerance to drought or wet conditions, resistance to pests and diseases among others.

Demonstration on beans under sub-project “Performance of bean genotype under multi environments in Lesotho and Angola” is led by Dr Puleng Letuma. Thirty-six (36) bean varieties accessed from CIAT have been demonstrated. The purpose was to study performance of those varieties under varying environmental conditions hence, address climate change challenges on bean production. The farmers would then be able to select and adopt the best performing varieties with a hope



Fig. 4b: Bean demonstration

that they would be able to complement the already available bean

varieties in Lesotho.

Another bean demonstration under sub-project “Screening bean and cowpea varieties and advanced breeding lines for productivity in low soil fertility and drought prone areas in Angola and Lesotho” is led by Dr Botle Mapeshoane. Twenty (20) bean varieties that are known and used country wide were collected from farmers and planted. Performance of these bean varieties would be determined in soils with low fertility in terms of phosphorus and nitrogen. Drought resistance would also be determined hence, the study of their root systems. This sub-project is on-going and the results would be availed to the farming community after three planting seasons.

Peach tree nursery was also visited by the participants on this field day.

This is under sub-project

“Collection, characterization and conservation of Cassava, Peach trees and indigenous leafy vegetables germplasm in Angola and Lesotho” led by Mrs Matsikoane Sefotho. Different peach stones

had been collected country wide and

nurseries established in stations of the DAR representing Lowlands, foothills and mountains. The nurseries would be established on-farm level as well and conservation of those various fruit trees would be made in the form of orchards.

Field day participants were also directed to potato demonstration led by Mr Refuoehape Chabalala in Siloe research station. Panamera potatoes have been demonstrated and are high yielding, have good quality and resist



Fig. 4c: Potato demonstration

pests and diseases. They were divided in to three (3) blocks from which yield would be determined based on two parameters; planting rate against time of earthing-up. This study is on its first season and the findings would be disseminated to the farmers after the third season.

This field day was graced by the presence of the Director of Field Services (DFS), Director of DAR, Director of Planning and Policy Analysis, District Administrator, District Agricultural officer (i.a), Village chief, NGOs such as RSDA and SMARDT, officers from different departments of the Ministry of Agriculture, Marketing and Food Security, extension officers and farmers.

By: Lefutso Ramokoatsi

5. EXCHANGE VISIT PROVES BENEFICIAL TO FARMER FIELD SCHOOL MEMBERS

Thirst for information and new knowledge has seen farmer field school (FFS) members from Malaoaneng Ha Seetsa attending exchange visits at Nkoeng Ha Shepeseli, Leribe. Need for knowledge sharing prompted the “drivers to technology adoption and dissemination” sub-project under APPSA to organ-

Maize (ZM521 and 523) and Beans (NUA 45 and Pinto) The exchange visit provided FFS members and other farmers with an opportunity to learn about improved maize and bean varieties in terms of general production from seed to seed. These maize and bean seed varieties

In this event, FFS members had an opportunity to learn about the displayed exhibits such as different bean varieties, maize, leafy vegetables, potatoes, roasted maize meal, preservations (jam, peaches, vegetable Atchar and beetroot) and handy crafts



Fig. 5a: FFS members at the exchange visit and signing

ize a 1-day exchange visit on the 7th April 2022. The event was graced by the presence of local chief, councillor, FFS members, invited farmers, District Agricultural Office (DAO) Leribe staff at Central Office and Resource Centres, DAO Maseru, Lesotho Agricultural College (LAC), Small-holder Agricultural Development Project (SADP), Agricultural Productivity Programme for Southern Africa (APPSA) and Department of Agricultural Research (DAR) representatives.

were demonstrated at both Nkoeng and Malaoaneng in order to enhance their adoption to FFS members and neighbouring farmers.

On behalf of FFS members Mr Letsoela and Mr Smith indicated that the information they obtained during the training and conducting field activities had a huge impact on their farming. This was witnessed during presentation of Agro-

and information materials.

“The trip triggered and changed my attitude towards farming. I felt challenged to think big and to have a diverse picture about the whole idea of farming. I hope what we have learned will be the fuel to incorporate in us a learning-by-doing attitude”, said Mr Letlama.

An excited ‘Mamatli Matli narrated



Fig. 5b: Messrs Letsoela and Smith presenting AESA and exhibited products

The objective of this event was to share information and learn best agricultural practices among FFS members and other invited farmers. This was achieved through presentations, discussions, speeches, songs, traditional dances, tour to demonstration plots and displayed exhibitions. Both FFS focused on two crop commodities that are being promoted by APPSA under the DAR namely:

ecosystem analysis (AESA) activity. The members defined AESA and briefly informed the participants that it is the main decision-making tool for FFS, it involves regular field observations, data collection and analysis that lead to decision making. The activity is conducted in mini groups of 4-6 members on weekly basis.

how she learned about conducting AESA. She learned that record keeping is very important, for instance, planting dates, varieties planted, weather conditions, number of leaves etc. On his part, Mr Maphoto was particularly impressed by ZM maize varieties planted despite the challenges of rains experienced in this cropping

season. He learned that ZM varieties mature very fast and do not lodge.

APPSA and DAR were represented by Ms Lephole and Ms Nchee. Ms Nchee announced that



Fig. 5d: Nkoeng Chief welcoming the visitors, Extension officers and FFS facilitator



Fig. 5c: Mr Letsoela explaining to the participants the activities conducted at the plot such as variety of leafy vegetables planted, type of fertilizer used and kraal manure

APPSA was launched in 2019 as a six-year project that is expected to phase out in 2025. Like all other countries participating in APPSA, Lesotho APPSA also consists of three components: (1) Technology Generation and Dissemination; (2) Strengthening the Institutional and Enabling environment for Technology adoption (3) Emergency Response Contingency. She explained that the

main beneficiaries will be farmers and other potential end users of the improved technology and knowledge generated and/or disseminated by the project. In the same way these groups would benefit by participating in Research and Development projects and training activities such as FFS. She assured FFS members that APPSA would continue to invest in this activity to ensure that the technologies under study are adopted by the communities around Nkoeng and Ha-Seetsa.

By: Mokhantso Morahanye

6. APPSA-LESOTHO UNDERTAKES SOIL PROFILING AND CHARACTERIZATION IN ALL STATIONS OF THE DEPARTMENT OF AGRICULTURAL RESEARCH

Soil profiling is an important tool in soil nutrient management through which valuable insight into soil fertility status can be gained. Soils possess many physical, biological and chemical properties which exert great influence on the distribution and development of vegetation and life. It was in line with these principles that the Agricultural Productivity Programme for Southern Africa (APPSA) in the Kingdom of Lesotho undertook soil profiling and charac-

terization in all the 11 research stations of the Department of Agricultural Research (DAR). The activity which was led by two Horticulture Technicians from APPSA Lesotho in collaboration with an expert from Soils section as well as Farm manager, is expected to generate accurate soil data on research stations to assist scientific decision making.

APPSA is essentially based on partnerships and collaboration in implementing research and development

has established the Regional Centre of Leadership (RCoL) in horticulture-based farming systems. It is critical to ascertain soil status particularly on the sites on which research trials and demonstrations would be conducted.

The soil profiling including history and status in Lesotho research stations is important from crop husbandry point of view. So far, it has revealed the surface and the subsurface characteristics and qualities; namely depth, texture, structure, drainage conditions and soil-moisture relationships, which directly affect plant growth in the selected areas.

The next steps of this exercise will consist of a more detailed analysis at the DAR soils laboratory. Interpretation of soil results will be made as well as recommendations for soil use that have a minimal negative impact on the ecosystem. Loamy-textured soils are commonly described as medium textured with functionally equal contributions of sand, silt and clay. These medium-textured soils are often considered ideal for agriculture as they are easily cultivated and can be highly productive for crop growth.

By: Lefutso Ramokoatsi



Fig. 6: Soil profiling and characterization

(R&D) sub-projects focusing on commodities of both country and regional importance. Soil profiling and characterization play a pivotal role in providing guidance regarding crops and treatments to consider.

APPSA-Lesotho

7. APPSA-LESOTHO CONDUCTS A WORKSHOP ON ENVIRONMENT AND SOCIAL SAFEGUARDS MANAGEMENT FRAMEWORK AND GRIEVANCE REDRESS MECHANISMS FOR EXTENSION OFFICERS IN THE MOKHOTLONG DISTRICT



Fig. 7: Extension officers at the workshop

Twenty-two (22) extension officers from Thabang and Libibing Resource Centers in the Mokhotlong district participated in a two-day workshop on Environment and Social Safeguards Management Framework (ESMF) and Grievance Redress Mechanisms (GRM) from the 4th to 5th May 2022. The purpose of the workshop was to train extension officers on how to administer grievances emanating from the implementation of APPSA project, particularly on research and construction activities. Extension officers play a pivotal role in ensuring that technologies generated by scientists reach a greater number of farmers. They work closely with farmers hence, stand a better chance to note their grievances regarding APPSA activities.

APPSA-Lesotho, amongst its many activities, will support upgrading of Research infrastructure, including construction and rehabilitation of buildings in Maseru, Mohale's Hoek, Leribe and Mokhotlong Agricultural Research Stations. APPSA follow World Bank safeguards policies that aim to avoid, mitigate or minimize adverse environmental and

social impacts of projects. The project is guided by the two main regulatory and legal frameworks namely; Environmental Act 2008 and World Bank Environmental & Social Safeguard Policies. The latter augments environmental Act 2008 where there is short fall in Laws.

Extension officers were introduced to grievance redress mechanism through which queries or concerns can be lodged. The project team is then liable to respond within stipulated time frames and constraints. The significance of the environmental and social assessment in the project is to inform decision making, improve project design and implementation, to ensure avoidance and mitigation of adverse environmental and social risks and impacts especially those that may affect disadvantaged and vulnerable individuals and groups.

The grievance redress mechanism en-

ures that the project is responsive to the needs of beneficiaries, and addresses and resolves their grievances. It serves as a conduit for soliciting inquiries, inviting suggestions and increasing community participation by collecting information that can be used to improve operational performance and enhance the project's legitimacy among stakeholders.

District Extension Officer (DEO) in Mokhotlong, Mr Polao Tlali, highlighted the significance of the workshop on the overall extension undertakings in the district. Mr Tlali asserted that the knowledge attained from workshop will enable extension officers to assist APPSA with ease in attaining its objectives.

Proper management of grievances improves stakeholder participation and successful completion of project objectives.

By: Lefutso Ramokoatsi

Compiled by R. Nchee and M. Khesuoe

Tel: 22312395