DEPARTMENT OF AGRICULTURAL RESEARCH

BULLETIN, VOLUME 1, ISSUE 1

JANUARY 2019

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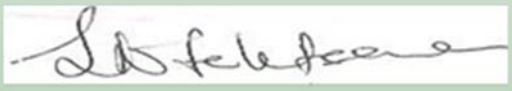
MESSAGE FROM THE OFFICE OF THE DIRECTOR

Welcome to the first issue of the Quarterly News Bulletin. I would like to wish all the stakeholders and our readers the best wishes of the New Year, 2019. May the year bring the best for all of us as it marks the end of the Fiscal year and thus preparation for the activities for the new Fiscal year as well as the Agricultural year. The Department has seen a number of successes for the year and these include the assistance of the Trade Related Facility Project, funded by European Union that has enabled engagement of the Phytosanitary Border Inspectors to improve the Phytosanitary System. The Government of Lesotho has invested in the agricultural research and innovations by securing a loan from the World Bank to enhance technology development that will intensify crop production and productivity in particular on horticulture. This move will see the Department of Agricultural Research being the Research Centre of Excellence of Horticulture in the SADC region. The launch of the bean recipe booklet which gives guideline on how to prepare the bean dishes from the zinc and iron bio-fortified beans, NUA 45 for the under fives to improve their health status in particularly address stunting. Through Capital Funding the GoL has also capacitated the Department through upgrading the Seed Testing, Soil Testing and Plant Protection laboratories. The Department is also at the advanced stage of evaluating bean material tolerant to harsh climatic conditions. Inside this bulletin there are six articles with topics ranging from guidelines on practices to attain the best maize crop to tackling bean pests, attention to fall armyworm as one of challenges brought by Climate Change. We hope you will learn a lot from this issue and contact us for clarification on any of the issues raised in this News Bulletin.

Director



Dr. L. N. Lebesa

2. TIPS ON BEST MAIZE PRODUCTION PRACTICES

2.1 Growing maize

When planting maize, the following are imperative to consider.

2.1.1 Soil sampling for analysis

In order to improve the productivity, all soil chemical limitations can be determined effectively by soil sampling and laboratory analyses for nutrients. Sampling should be done two months before planting. Extension agents can assist farmers to take samples (Figure 2.1)

Fig. 2.1 An officer taking soil

2.1.2 Selecting maize varieties

Varietal choice can have a significant impact on the yield and quality of the crop, if done accordingly. Cultivars differ from one another with regard to a variety of characteristics. Therefore, every cultivar has its own adaptability and yield potential. These differences between cultivars leave a producer with alternatives that can be utilized fully. The producer should, however, first verify the reaction of new or foreign cultivars before abandoning proven cultivars. DAR has done detailed work in variety screening and recommendation of suitable varieties for Lesotho conditions. (Figure 2.2) The following are recommended for white maize varieties; PAN 4M-19, DKC2147, CG4141 and for yellow varieties the following g are recommended DKC73-72, DKC80-10, DKC61-90 and PAN12.

2.1.3 Seedbed preparation and sowing operation

Maize requires a friable, well aerated, moist, and weed free seedbed to provide better contact between the seed and the soil, however, there is no need to prepare an extremely fine seedbed. The first ploughing should be done with soil inverting plough so that at least 20-30cm deep soil may become loose. Disking/or harrowing should follow it. If the soil is too wet or too dry or the maize seed is planted too deep, seeds will be slow to emerge or fail to germinate at all. Maize also establishes very well under a no-tillage system where the stubble is retained from the previous crop, provided the field is relatively even and kept free from weeds by hand-chipping or spraying as required. Maize is then sown directly into the standing stubble without the associated costs of ploughing. Maize is not a drought tolerant crop, so good soil moisture at sowing time is required before the crop is planted. It is recommended that there be at least 30 cm of moist soil throughout the soil profile before sowing. Planting depth of maize varies from 2 to 5 cm, depending on the soil type and planting date. As a rule of thumb, planting should be shallower in heavier soils than in sandy soils.

2.1.4 Planting time

Planting can commence as soon as moisture and soil temperature are suitable for good germination. If minimum air temperature of 10 to 15 ^{0}C is maintained for seven successive days, germination should proceed normally. In Lesotho maize is normally planted during the months of October to mid-December.

2.1.5 Planting, sowing rate and plant population

Plant maize seed at an even depth of 2 to 5 cm into firm, moist soil to ensure good seed-to-soil contact for moisture uptake and subsequent germination. If planting shallow, ensure moisture is sufficient and check soil temperatures are not too high as this will effectively cook the seed and germination will not occur. Plant density and row spacing are critical agronomic factors to get right when sowing maize to maximize yield. The highest yielding crops have an evenly distributed plant population across the whole field of approximately 53 000 to 66 000 plants/ha. Sowing rate, which depends on the germination and vigour of the seed, is usually 15 to 20 kg/ha. Choose a seed variety that suits the expected rainfall you receive in your area. Use short-season varieties in dry areas, and only choose a long-season type if you are in a very high rainfall area or you have access to irrigation.

Fig. 2.2 Evaluation trials showing high yielding screened varieties at DAR

By K. Likotsi

3. THE ROLE OF PLANT GENETIC RESOURCES DIVERSITY

3.1 About Diversity

The plant genetic resources (PGR) field is gaining momentum particularly in the face of climate change. The impact of climate change does not only pose a burden on transforming the agricultural sector but also threatens the sector development gains in the absence of resilient crop varieties. Lesotho is not an exception of this scenario.

Fig. 3.1.1 Plant Diversity at the Lesotho National Plant Genetic Resources Centre

Mankind depends on crops for its major needs which extend more pressure on genetic diversity. The genetic diversity of plants and crops cultivated under the direct management of farmers around the world is a reservoir of resilience and adaptability in order to face the food and nutrition security challenges ahead.

Genetic Diversity is of vital importance in breeding varieties of crops with desirable characteristics including increased resistance to pests and diseases and greater adaptation to heat and drought.

Nonetheless, the very same genetic diversity is highly threatened and in some cases totally extinct for different reasons including the monoculture practices, poverty, environmental degradation and urban development among others. The need for restoration through the development of PGRFA related institutional programmes and frameworks is obligatory.

3.2 Lesotho Gene Bank

In view of the above background, . The Lesotho National Plant Genetic Resources Centre (LNPGRC) was established in 1989 as a regional call to conserve and enhance the utilization of the local germplasm (both crops and wild plants) through collection, documentation and medium term storage of seed samples, known as accessions A broad range of food, feed crops and plants of medicinal and industrial importance are conserved at national, regional and international levels

The Lesotho National Plant Genetic Resources Centre currently holds about four thousand accessions of which the majority 90.8% is landraces in the Gene Bank. These are cultivated plants that have a historical origin, distinct identity, lack formal crop improvement, genetically diverse, locally adapted and associated with traditional farming systems. 8.74% are wild species and 0.45% of indigenous vegetables.

A total of 1179 accessions are kept at the regional gene bank at SPGRC in Zambia for duplication and long-term conservation and at Svalbard in Sweden for safety duplication.

Major germplasm collection trips in Lesotho began in the nineties as rescue missions due to construction of Katse , Mohale and lately Metolong.

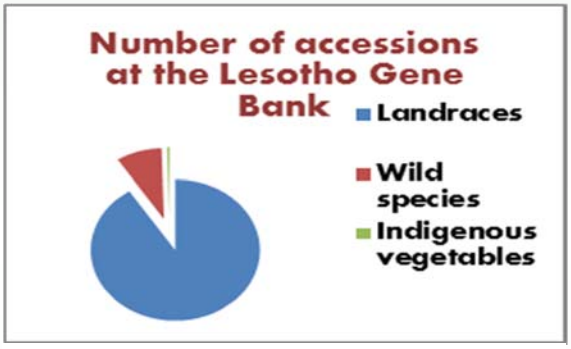


Fig. 3.2 .1 Accessions at the National Gene Bank

The diversity within and between crops is eroding in general. However, accessions in the Lesotho gene bank still reflects some genes with physical differences in seed colour, shape and texture, that have accumulated through natural and human selection over hundreds of years

3.3 Safety Duplication of accessions at Svalbard

Plant genetic resources are the sources of plant genetic diversity and as such need to be conserved entirely to prepare for the unknown future needs. Hence Lesotho accessions are also kept in Svalbard. Global Gene bank for safety. (www.svalbard Global-seed-vault)

Fig. 3.3.1 Svalbard Gene Bank in Sweden

By M. Mohloboli

4. INDISPENSABLE BENEFITS OF POTABLE WATER IN HUMAN NUTRITION AND HEALTH

4.1 Introduction

Potable water is water that is considered safe to drink. With the summer heat, coupled with the effects of our modern day phenomenon "global warming and it effects", the importance of drinking water cannot be over-emphasized. Water provides everything the body needs to restore fluids lost through metabolism, breathing, sweating and the removal of waste. It is the perfect beverage for quenching thirst and rehydrating the body system. The amount of water one should drink on a daily basis depends on individual lifestyle, habits, fitness, weight, activity level and other factors that affect health. There is a saying in Sesotho that: "Metsi ke bophelo" which translates into "Water is life" in English.

This article is meant to shed some light into the value of water as a beverage in our diets, nutrition and health in a broader perspective .

www.exrberliner.com [accessed 27/11/2018]

4.2 Benefits of Water

Solid foods contribute approximately 20% of total water intake or about 700-800 mL. The remainder of the dietary intake comes from free water and/or other fluids. Most people are not cultured in the habit of drinking water and this makes us susceptible to a multitude of dehydration related sicknesses.

Health benefits of water are as follows:

- Water helps maintain the right balance of electrolytes in the body.
- Water also transports hormones, nutrients, oxygen and antibodies through the blood stream and lymphatic system.
- Our bodies' proteins and enzymes are more efficient in solutions of lower viscosity (i.e., diluted), thus making drinking water a must.
- Water makes us BRAINY, meaning it improves our reaction time in mental activities.
- Water boosts our physical performance as it is involved in transferring oxygen to the muscles and helps to efficiently perform physical activities.
- Water plays vital role in the kidneys during body toxins/waste removal.

4.3 Effects of dehydration

Dehydration of as little as 2% loss of body weight results in impaired physiological responses and performance. The reported health effects of chronic mild dehydration and poor fluid intake include increased risk of kidney stones, urinary tract cancers, colon cancer and mitral valve as well as diminished physical and mental performance. Dehydration is a major factor in causing headaches and migraines.

In all things, drinking enough water will keep you in a good mood since all bodily functions and water needs will be catered for. So do not obey your thirst - thirst reflex is the last signal of excessive dehydration. By the time you become thirsty, the damage has already been done. So do not wait until you are thirsty. Constantly drink water throughout the day.

4.4 Effective ways to drink water for maximal absorption into our bodies:

I. Drink lukewarm or hot water instead of ice cold water; Ice cold water freezes the enzymes and fluids in the gut resulting in the body unable to properly digest food, which creates toxic build up. In addition, the blood vessels constrict so the toxic build up gets stuck inside you instead of draining through your lymph (cleansing) system. Blood vessel constriction also prevents blood from circulating necessarily, restricting organs from getting nutrients when they need them.

II. Add these ingredients to water to increase absorption; lemon slice/ squeeze, ginger slice, unrefined mineral salt (not ordinary table salt) or soak fruit to infuse a refreshing taste e.g. Kiwi- Raspberry- Peach | Lemon - Cucumber -Mint | Strawberry -Basil | Pineapple-Lemon-Mint etc.

III. During the day, sip water but do not chug – especially with meals; take sips, not full-glass chugs. Small sip, swallow, breathe. Repeat. Sip water throughout the day because if you chug too much water at once the body does not actually absorb all of it. Most of it will run right through you. Do not chug water with meals because you are killing the digestive fire that is trying to process the food.

Iç. It is recommended to drink 8 cups of water daily; there is neither scientific evidence to support this recommendation nor actual RDA for water because we are all different sizes with varied diets and lifestyles. However this would be a good way to start. One can schedule the eight glasses per day as follows:

- 7:00 - 1st Glass - Before eating
- 9:00 – 2nd Glass - Approximately 1 hour after breakfast.
- 11:30 – 3rd Glass – About 30 minutes before lunch.
- 13:30 – 4th Glass - An hour after lunch
- 15:00 – 5th Glass - During tea break to freshen one's mind
- 17:00 – 6th Glass - After tea break to keep one satiated
- 20:00 – 7th Glass - An hour after dinner
- 22:00 – 8th Glass - An hour before bedtime to aid cell renewal process during sleep.

By L. Mokhesi

5. SEED CERTIFICATION

5.1 Seed

Seed in a broad sense, is a material which is used for planting or regeneration purpose. It is the most vital and crucial input for crop production. It is therefore important to use seed of high quality for planting which is: free from other crop seeds, free from objectionable weed seeds, free from designated diseases, of high germination and vigor, and with optimum moisture content. For seed to obtain these attributes it has to be certified. Seed certification is a process done at DAR and it is a special technical process with strict controls to carry out.

Fig. 5.1.1 Seed certification steps at DAR

5.2 Seed Certification

This is an evidentiary and field inspection based process by which a state seed certifying agency gives official recognition to seeds of a named variety/ cultivar produced under a limited generation system which ensures that genetic purity, identity and a minimum level of quality are maintained during multiplication from one generation to the next. Certified Seed is a clean, genetically pure, fully traceable, weed-free, guaranteed seed product with superior quality.

It is the starting point to a successful crop as well as an important risk management tool.

5.3 Advantages of seed certification

- Provides a better control system for following up on complaints
- The certificate, seal and a label are a guarantee of varietal purity and seed quality
- Seed undergoes strictly monitored quality management systems to maximize varietal purity
- Certified seed is grown and processed under stringent production requirements with strict limits on weeds and other crop kinds.
- Inspections in the field and at the processing plant ensure that all quality assurance requirements have been met and documented.
- Gives satisfaction to the buyer

Food safety and traceability are important considerations in agriculture. One can only be sure of their products if they know their origins. Certified seed is the key to that knowledge: production of this seed is carefully controlled under a quality assurance system right from the beginning. Using certified seed will allow farmers to capitalize on traceability measures.

By: M. Selikane

6. BEAN PESTS AND THEIR MANAGEMENT

6.1 Introduction

Beans are still by far the most reliable source of protein for many Basotho households. There are pests that attack beans from the seedling stage all the way to storage stage.

6.2 Bean seedling pests and their management

6.2.1 Cutworm, cutworm cuts the seedling at the base and can be managed by;

- digging 5 cm around the seedling and crushing the worm physically.
- insecticides application on large-scale farms.

Fig. 6.1 Cutwork larva

6.2.2 Pollen beetle causes plants to appear yellow and their growth is stunted resulting in empty pots. Management of bean foliage include;

- post-harvest tillage and
- crop rotation.

Fig. 6.2 Pollen beetle: on the bean leaf

At flowering stage, beans are attacked by pests like **flower and pollen beetles**. These pests feed on petals and pollen causing large infestation, which may result in reduced pod setting and low yield. These pests can be managed by application of insecticides.

6.2.3 Bean weevil

- Weevils develop in the field and in storages
- In beans, it lays eggs on a developing bean pod in the field
- The small entrance hole heal quickly and the larvae feeds within the developing seed
- Damage
- It feeds on all types of grain as well as other seeds in storage are attacked.
- Heavily infested grains are reduced to the shells.
- Infested grains contain holes through which adults have emerged.
- Larvae feed on grain in moderate temperatures

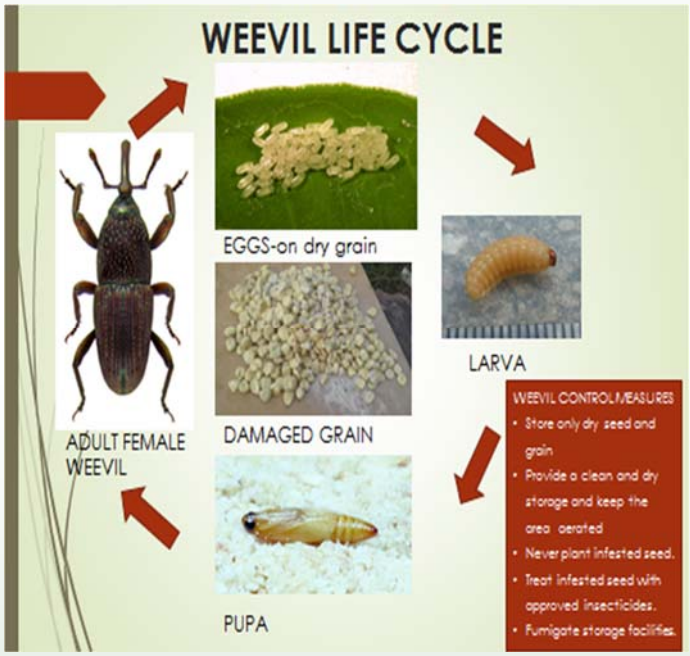


Fig. 6.3 Weevil lifecycle

By L. Motopi

7. FALL ARMY WORM: *SPODOPTERA FRUGIPERDA*

7.1 Introduction

Lesotho is facing climate change impacts and unpredictable weather patterns and since it is summer, there is a likelihood of out breaks due to high temperatures and late rains. Fall army worm (FAW) could highly be one of the new out break in Lesotho.

FAW is a dangerous transboundary pest of maize, which is native to tropical and subtropical regions of the Americas. It can have a number of generations per year and the moth can fly up to

Fig. 7.1: FAW

100 km per night.

FAW was first detected in Central and Western Africa in early 2016 and further reported and confirmed in whole of mainland Southern Africa (except Lesotho). *S. Frugiperda* is a transboundary pest therefore its appearance in some countries in Africa raises the level of threat to other regions of the continent not yet infested and other tropical and subtropical regions of the world.

7.2 Crop preference

It is polyphagous pest; and though has preference for cereals but displays a wide host range attacking over 80 different plant species including major crops such as cotton, groundnuts, sorghum, wheat, potatoes, soybean and sugarcane. It feeds on more than 80 plant species, including maize, rice, sorghum, millet, sugarcane, vegetable crops and cotton. FAW can cause significant yield losses if not well managed

7.3 Biology and life cycle

The number of eggs per mass varies considerably but is often between 100 and 200 total egg production per female, averaging at about 1500 to a maximum of over 2000.
The female also deposits a layer of scales between the eggs and over the egg mass, imparting a furry or moldy appearance.

Duration of the egg stage is only two to three days during warm conditions.

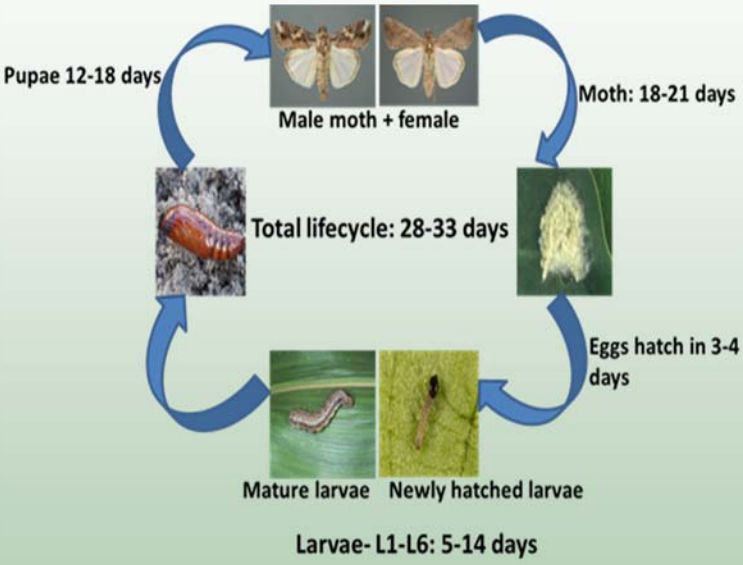


Fig. 7.2: FAW lifecycle

Fig. 7.3: FAW damage on: a) leaves, b) stem, c) grain

7.4 Mode of damage

Damage symptoms

7.5 Management

FAW has shown resistance to chemical treatment . It is therefore important to control FAW before it goes out of hand, hence a need to have the capacity to carry out scouting on a regular basis as soon as the plants emerge from the ground, for early pest detection and management. Monitoring trap for early pest detection

- Control needs to be considered when egg masses are present on 5% of the plants or when 25% of the plants show damage symptoms and live larvae are still present.
- Controlling larger larvae, typically after they are hidden under the Fras plug, will be much more difficult.

Fig. 7.4: FAW monitoring trap at Matsieng

- IPPM is recommended, with chemical spraying as a last resort.
- Treatments must be applied before larvae burrow deep into the whorl or enter ears of more mature plants.

To achieve timely control of FAW outbreaks, it is prerequisite to have in place an effective monitoring, forecasting and early warning system. An early warning system enables farmers to prepare for pesticides and spray equipment required for the control operations. With a functional early warning system, an alert of imminent outbreak is issued with advice to farmers to check their farms and undertake effective and efficient control operations on time.

8. WORLD FOOD DAY CELEBRATION

The event is celebrated across the world in support of FAO mission in order to raise awareness and gather great support and understanding to the approaches that can help to end world hunger. The theme for this year was **"Our actions are our future, A # Zero h\Hunger World by 2030 is Possible".**

Fig. 8.1 Director of Agricultural Research Dr Lebesa explaining Phytosanitary and Quarantine Measures

In Lesotho, the World Food Day Celebration was held at Ha Ramosothoane in Mohales'Hoek District on the 16th October 2018. The occasion was graced by the presence of the Right Honourable the Minister of Agriculture and Food Security and

Fig. 8.2 Homemade preserved and dried fruits displayed by DAO-Mohale's Hoek

the Minister of Social Welfare and Development and other high ranking government officials. To address this theme, All MAFS departments took part. NGOs such as World Vision, RSDA and Growing Nations also participated in the event. The World Food Day program of activities featured cultural food dishes, preserved vegetables and fruits, dressmaking, agricultural displays and other activities promoting Food and Nutrition Security.

By. M. Morahanye

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