DEPARTMENT OF AGRICULTURAL RESEARCH

The investigator, the light in the farming zone

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Inside this issue:

1. MESSAGE FROM THE DIRECTOR OF AGRICULTURAL RESEARCH

This issue is filled with exciting issues as it covers a range of topics from technical to outreach events. Among these are the meetings the Department had with stakeholders to discuss some of the pertinent issues relating to our core business such as facilitating smooth implementation of our upcoming project APPSA which is funded by World Bank. Various topics such as guidelines on maize crop management, the use of some crops for health purposes and the laboratory services such as those measuring pesticides residues in plants prepare farmers and other end-users of our technologies for the cropping seasons ahead. The Seed Policy awareness campaigns that the Department together with other MAFS departments have undertaken are crucial to sensitize all stakeholders in the seed industry. DAR also has collaboration with various stakeholders in the Agriculture sector and therefore takes part to ensure desired results are achieved by all stakeholders. We hope you will learn a lot from this issue and you can contact us for any clarification or queries.

Dr Lefulesele Lebesa

2. LESOTHO STAKEHOLDER CONSULTATION WORKSHOP ON ESMF UNDER (APPSA)

The Department of Agricultural Research (DAR) held a one-day workshop in Maseru Lesotho on the Integrated Pest Management Plan (IPMP) and the Environmental and Social Monitoring Framework (ESMF) papers. These documents were submitted in compliance with the Environmental Act of 2008 for application of environmental clearance for DAR's upcoming research project, Agricultural Productivity Program for Southern Africa (APPSA).

The objective of the workshop was to validate and review these two documents. The Director of the Department of Agricultural Research, Dr. Lefulesele Lebesa welcomed the participants, thanked them for attending the workshop and gave a brief overview of APPSA project as a regional project under coordination of the Centre for Coordination of Agricultural Research and Development for

Southern Africa (CCARDESA). The main objective for APPSA is to increase the productivity and production on Horticultural crops and other selected crops, beans and sorghum through development of technologies and their dissemination in the country and other SADC countries.

The participants were from the Ministries of Agriculture and Food Security, Environment, Water Affairs, Forestry, Academia and the NGO's. The officer from the Ministry of Environment indicated that it is imperative that projects as big as the one anticipated by the DAR should have in place these two documents as required by the law. Moreover, the presence of these documents enables the DAR to be issued an environmental clearance, which will indicate that the environmental and social safe guards have been taken into consideration to ensure sustainable development.

To kick-start the workshop, brief details about the different components of APPSA were presented as a reminder of what it entails and how ESMF and IPMP fit into this program.

The next presentations were on the overview of both ESMF and IPM as well as on the potential Impacts and Mitigation Measures. In terms of the Environmental and Social Safeguards, the consultant mentioned the tools that are needed when a project of this magnitude is undertaken. These are Strategic Environmental and Social Assessment (SESA), Environmental and Social Impact Assessment (ESIA), Environmental and Social Management Plan (ESMP) and Environmental and Social Management Framework (ESMF). IPM on the other hand is considered important because of the need to maintain the pest population at levels below those causing economic injury. The presentation outlined how APPSA will manage pests in an environmentally friendly manner with the aim of reducing reliance on chemical use.

3. CROP MANAGEMENT-WEED MANAGEMENT AND CONTROL

A weed is any plant growing in a wrong place, usually considered undesirable.

Successful cultivation of maize depends largely on the efficacy of weed control. Weed control during the first six to eight weeks after planting is crucial, because weeds compete vigorously with the crop for nutrients, water and light during this period and this makes the plants weak and susceptible to attack by pathogens. Weeds can be a problem in the production of crops because they reduce yield as well as its general performance. Weeds further harbour pests and diseases. Weeds can also make it difficult to harvest the crop, and seeds of some species can contaminate the grain and reduce the quality and price of the grain. Certain seeds, such as those of the thorn apple (Datura), may be poisonous when consumed by animals or humans. Farmers should use an integrated approach for the management of weeds that combines all available options. The aim is to keep the weed numbers low and prevent them from producing seeds throughout the cropping cycle.. Uncontrolled weeds compete with the crop of interest for nutrients, moisture and space, may completely suppress the crop if uncontrolled. They also harbour pests and diseases. Young maize seedling can easily be overwhelmed by weeds. Weeds take full advantage of the wide rows and upright growth of maize, colonising the bare soil beneath.

Figure 1: A noxious cocklebur weed in one Leribe field

Figure 2: A noxious thorn apple/datura weed in a field

Types of weeds

They are major broadleaf and grass weeds and include the following.

Broadleaf weeds: black jack (bidens Pilosa), witch weed/striga (striga asiatica), cocklebur, thorn apple (datura)pig weed (Amaranthusspp).

Grass weeds: love grass (cynadonspp), cough grass (digitariaspp), Bermuda grass (cynodondactylon), yellow nutsedge (cyperusasculentus, purple nutsedge (cyperusrotundus).

Benefits of timely weed control

- It protects the palatability and nutritional potential of the crop.
- It substantially curtails opportunities for pests' establishment in the crop.
- It eliminates competition for light, nutrients and moisture, giving the crop the opportunity to establish well.

Management and control

Early weed control is very crucial in maximizing maize yields. There are several ways to which can be employed to control weeds in a maize plantation.

Chemical method

It involves use of herbicides. They can be selective or nonselective, post or pre-emergence, contact or systemic, etc. eg,camixplus, primagramgold,servian, metagan gold etc.

Mechanical method

This involves the removal of weeds using tools and implements like rotovator, hoes among others.

Figure 4: Use of hoes for weeding at ha Leshoele in Leribe

Figure 5: A weed free maize field in Butha-Buthe at ha Mopeli ;Nqabene resource centre

Cultural method

- Planting fast growing maize varieties. Pull out weeds before seed setting.
- Use clean maize seed that is free from weed seed.

By K. Likotsi

4. NUTRITIONAL AND HEALTH BENEFITS OF CHILLIES

Brief Introduction:
Chili is a small hot-tasting pod of a variety of capsicum, used in sauces, relishes, and spice powders. There are various forms with pods of differing size, color, and strength of flavor. Loaded with Vitamin C and beta-carotene, green chilies are great for healthy eyes, skin and immune system. When eaten, green chilies release endorphins that boosts the mood, and reduces pain. Chilies, regardless of some negative effects, have special health benefits as outlined below.

Figure 6: from Unsplash Photos by: Colin Mc Murry

1. Improves Cognitive Functioning
One needs proper amounts of oxygen and iron for him to achieve and maintain good cognitive performance. Spicing up your meals with chili peppers everyday can decrease the chance of getting cognitive disorders such as dementia when old age kicks in.

2. Contributes to red blood cell formation
Anemia and fatigue are caused by iron deficiency. Chili peppers contain copper and iron. These minerals are vital for new blood cell formation.
Chili pepper is also rich in folic acid. Folic acid aids in the production of red blood cells and fights anemia. It also plays a vital role in rapid cell division and growth in pregnancy. Pregnant women must never undergo folic acid deficiency; otherwise, it could lead to certain birth defects in newborns.

3. Reduce Blood Pressure and Prevents Cardiovascular Disease
1. Chilies contain potassium. Potassium is a mineral that plays different functions in the body. An adequate intake of potassium combined with folate can greatly reduce the risk of heart diseases. Potassium relaxes blood vessels; thus creating ideal blood flow.

Chili peppers are also an excellent source of riboflavin and niacin. Niacin increases a person's good cholesterol levels, also reducing the risk of cardiovascular diseases. Niacin deficiency can only lead to a disease called Pellagra. Pellagra is characterized by insomnia, dementia, and diarrhea. Spicing up meals with hot peppers is the first step one can take in preventing atherosclerosis.

4. Acts as Natural pain Relief
Topical capsaicin is used to alleviate pain caused by osteoarthritis and diabetic neuropathy. It works by desensitizing sensory receptors, and possesses anti-inflammatory effects.

5. Clears Nasal Congestion
Capsaicin not only alleviates pain but also relieves congestion. Its fiery heat stimulates secretions that aid in clearing mucus from stuffy nose. Capsaicin has antibacterial properties that combat against chronic sinus infections.

6.Soothe Intestinal Diseases and Disorders
Chili peppers are often used as food preservatives because of its antibacterial and anti-fungal properties. Capsaicin can kill bacteria such as H. pylori and cure inflammatory bowel diseases.

7. Boosts Immunity
The bright red color of chili peppers indicates its high pro-vitamin A or beta-carotene content. One can achieve about 6% of the recommended daily value for Vitamin C with just two teaspoons of red chili peppers. Vitamin A is vital in keeping a healthy respiratory tract, intestinal tract, and urinary tract. Vitamin A is also known as the anti-infection vitamin and serves as the first line of defense against infections.

8. Maintains Healthy Eyes
People need vitamin A to keep their eyes healthy at all times. Including chili peppers in their regular diet, approximately one tablespoon each day, can definitely improve their eyesight. It also prevents night blindness as well as macular degeneration.

9. Chili Peppers Can Help Prevent Stomach Ulcers
Chilies can actually prevent stomach ulcers. Red-hot chili peppers kill bacteria that you may have ingested and stimulates the cells lining the stomach to release buffering juices. This is in direct contrast to the belief that peppers worsen the development or outcome of these ulcers.

10. Promotes Weight Loss
Obesity is a serious health condition and must not be taken lightly. One can lose weight by eating chilies regularly with the inclusion of regular exercise, of course. Capsaicin is thermogenic. It reduces your cravings and increases your metabolism. The heat you feel after consuming chili pepper already takes energy and burn calories. Even cosmetic manufacturers have incorporated chili peppers in slimming cosmetics.
1. In addition, a three sentence brief generalizing the benefits and way forward for accessibility and use.
Add green chilies generously to all your

meals, not just to enhance flavor, but also to give you all these health and medicinal benefits. With zero calories, it helps dieters achieve their goals faster and maintain body weight. Chilies can be planted in Lesotho, even in a very small yard. It can also be preserved through various methods such as drying and sauces.

By M. Molapo and M. Lephole

5. NUTRITION AWARENESS CAMPAIGN IN QUTHING DISTRICT

The Ministry of Agriculture and Food Security (MAFS) in Lesotho through its Quthing Agricultural District Office held a Nutrition Awareness Campaign on the 23rd April 2019. This was a collaboration of different stakeholders such as FAO, Maluti Rotary, National University of Lesotho (Faculties of Agriculture and Health Sciences), Ministry of Health and Ministry of Education.

The objectives of the campaign were to:

- Create awareness on proper nutrition for health and well-being of children under five
- Encourage/promote informed food choices
- Develop sound eating habits
- Develop physical activity habits
- Promote Water, Sanitation and Health (WASH)

Quthing District is situated in the Northern Part of the Country and has been declared as of the Districts where malnutrition of children under-five years of age is high. Lesotho Demographic and Health Survey (LDHS) of 2014 has shown that Quthing is still above WHO thresholds in terms of stunting, which stands at 38.1% for the under-fives.

The Quthing District Agricultural Officer; Mrs. Maphakamile Xingwana presented the purpose of the campaign. She mentioned that this is the second year they have this kind of a campaign and their main goal is to take three years where they hope that by end of this period the communities in Quthing District would be in a position to nourish their children in a manner that addresses malnutrition especially stunting. She further mentioned that the concept of proper nutrition does not only apply to the under 5s but rather starts at the conception stage where the District Nutrition Office together with its partners are also buzzy encouraging pregnant and lactating women to eat well, exercise and attend nutrition trainings that are conducted regularly in the District.

The Department of Agricultural Research (DAR) was therefore invited to participate and support initiatives to fight against malnutrition of this targeted group through the display of food products and engaged in farmers' discussions on how best to tackle malnutrition problem. The Food and Nutrition Division of the DAR handed out booklets, discussed and displayed NUA 45 Bean products prepared mainly for children under 5 years of age. This bean is rich in micronutrient that contain a higher concentration of Iron and Zinc than normal dried beans. Prepared food products included plain bean puree, roasted bean flour; bean flour, bean puree mixed with pumpkin and mashed potatoes, as well as NUA 45 biscuits as depicted in the figure below.

Among the dignitaries who graced this event with their presence was the Deputy Minister of Agriculture and Food Security; Honourable Dr. Nthabiseng Makoae. Since this was a nutrition day, other vegetables were also displayed. Below is a picture showing the Deputy Minister going through the stalls.

Figure 7: The Deputy Minister of MAFS inspecting the stalls

By: R. Nchee

Figure 8: The bio-fortified bean-based products on display by DAR for under 5 year olds

6. ACQUISITION OF HPLC SYSTEM TO DETECT PESTICIDE RESIDUES IN PLANTS AND PLANT PRODUCTS

The Department of Agricultural Research recently received HPLC system, which will be used to detect pesticide residues in fresh vegetables to improve and strengthen national SPS and Food Safety Control Management. Pesticides are widely used in producing food. Pesticides are used to protect crops against insects, weeds, fungi and other pests. These pesticides may remain in small amounts (called residues) in or on fruits, vegetables, grains, and other foods.

Figure 9: HPLC system for analysing pesticide residues.

None of the pesticides that are authorized for use on food in international trade today are genotoxic (damaging to DNA, which can cause mutations or cancer). Adverse effects from these pesticides occur only above a certain safe level of exposure. When people come into contact with large quantities of pesticide, this may cause acute poisoning or long-term health effects, including cancer and adverse effects on reproduction. Food that is sold should comply with pesticide regulations, in particular with maximum residue limits. Consumers can further limit their intake of pesticide residues by peeling or washing fruit and vegetables, which also reduces other foodborne hazards, such as harmful bacteria.

To protect food consumers from adverse effects of pesticides, World Health Organisation (WHO) reviews evidence and develops internationally accepted maximum residue limits. WHO in collaboration with FAO, is responsible for assessing the risks to humans of pesticides, both through direct exposure, and through residues in food and for recommending adequate protection.

Risk assessments for pesticide residues in food are conducted by an independent, international expert scientific group, the Joint FAO/WHO Meeting on Pesticide Residues (JMPR). These assessments are based on all of the data submitted for national registrations of pesticides worldwide as well as all scientific studies published in peer-reviewed journals. After assessing the level of risk, the JMPR establishes limits for safe intake to ensure that the amount of pesticide residue people are exposed to through eating food over their lifetime will not result in adverse health effects.

These acceptable daily intakes are used by governments and international risk managers, such as the Codex Alimentarius Commission (the intergovernmental standards-setting body for food), to establish maximum residue limits (MRLs) for pesticides in food. Codex standards are the reference for the international trade in food, so that consumers everywhere can be confident that the food they buy meets the agreed standards for safety and quality, no matter where it was produced. Currently, there are Codex standards for more than 100 different pesticides.

It is for this reason that the Department of Agricultural Research procured HPLC system that will assist the country to comply with WTO SPS requirements on general principles related to Food Hygiene (HACCP). The Ministries of Agriculture and Food Security, Health, Trade and Industry, are together working on a project to formulate an effective national food safety system. The project aims to find ways to address the persistent predicament with the current food safety situation in the country through policy formulation. The policy will provide a framework for a coordinated approach to food control, outline the national objectives of the food control system, set goals for the medium to long term and outline the roles and responsibilities of the various stakeholders giving them legal mandate as appropriate.

By: M. Molatela and B. Kuenene

7. DEPARTMENTS OF AGRICULTURAL RESEARCH, CROPS AND PLANNING AND POLICY ANALYSIS CONDUCT AWARENESS CAMPAIGNS ON THE NATIONAL SEED POLICY

The Department of Agricultural Research together with wide stakeholder consultation, lead a development of a National Seed Policy, which was approved by the Cabinet. The policy is awaiting the enactment of legislation that will provide control and guidance to the country's agriculture sector development activities. In an effort to create awareness to familiarize stakeholders with the policy requirements and obligations, meetings facilitated by Departments of Agricultural Research (DAR), Crops (DOC), Planning, and Policy Analysis (DPPA) were held for districts stakeholders, which included Government ministries, farmers associations, input traders and district NGOs.

The goal of the Policy is to ensure the availability of quality seed of various crops to farmers in an efficient and sustainable manner in order to enhance crop productivity and food security in Lesotho and for export. The Policy deals with issues surrounding the quality of seed and vegetative planting material, whether it is agricultural, ornamental, or for forestry. It focuses on the development and implementation of seed programs in order to avail adequate high-quality seed and planting material to the farming community.

The Seed policy recommends improvements in the following areas for effective implementation; Research and Extension, Seed trade (Importation and exportation), Seed Production and Processing, Seed quality control, Seed Marketing and Distribution, and Strategic Seed Reserve. Implementation strategy cover the institutional and legislative arrangements. The institutional arrangements envisage policy level advisory and coordination at the national level through the establishment of the National Seed Council to oversee all activities in the seed sector; and two bodies: the Seed Certification Service and the Crop Variety Release Committee which will report to the National Seed Council. Each body will be responsible to the Council on matters pertaining to its mandate.

Legislative arrangements recognise the need to enact enabling legislation -the Seed Act-for policy enforcement and application. This also calls for the promulgation of a Seed Certification Scheme as part of the enabling regulations of the Seed Act. The Office of the Parliamentary Counsel is currently drafting the Bill, which will be tabled before parliament soon after drafting and validation by relevant stakeholders. The Department is working on a set of technical guidelines that stipulate field and laboratory standards that certified seed grown by seed companies in Lesotho has to meet.

By B. Kuenene

Figure 10: Stakeholders at National Seed Policy awareness campaign

8. DAR CONDUCTS DEMONSTRATIONS ON SUNFLOWER UNDER LASAP PROJECT

The Lesotho Adaptation of Small-Scale Agricultural Production project (LASAP) is designed to promote resilience in agricultural investments and to build the capacity of Lesotho smallholders and institutions to address climate change impacts on agricultural production. As an add-on to the Smallholder Agricultural Development Project, the LASAP sees climate resilience as a key factor of sustainability and Sunflower (Fig. 1) was chosen for demonstrations at Popopo and Ha Khotso in Mapoteng, because of its ability to tolerate a short period of drought. The crop has the capacity to extract water from deeper horizons and this makes it suitable on Berea soil series described in this area. The solum (soil profile) of this soil series overlies slowly permeable sandstone bedrock and this enables the profile to store water at deeper layers where crops such as sunflower can access this water during dry spells.

Figure 11: Sunflower demonstration at Mapoteng

Even though sunflower is not commonly planted in this, it has abundant health benefits that ensure a healthy life in the long run. Coupled with its ability to do well in short drought spells, farmers can reap the health benefits of sunflowers in two different ways; one way is with sunflower seeds and the other is from sunflower oil. Many people are unacquainted with the health benefits of eating sunflower seeds. Perhaps it is because they do not know that these seeds are a powerhouse of vitamins, minerals, and other important nutrients. They are rich in magnesium, potassium, selenium, zinc, and iron. They also improve digestion, brain power, and the functioning of the cardiovascular system. Some middle class people prefer taking sunflower seeds as a healthy snack between meals, as they provide ample energy in an easy way.

The purpose of this demonstration is to promote adoption of sunflower as a climate smart crop in this area and as a source of food and feed for animals. It will also be demonstrated as a source of oil using the Ram press extraction technology, which farmers can adopt and start small enterprises that can generate income for them.

The sunflower varieties used are PAN 7080 PAN 7100 PAN 7033 and PAN7057 planted on farmer's field with total area of 120m^2. Harvesting will be done in June and information will be published in the next issue.

By: K. Likotsi and B. Kuenene