

## **On-going Activities in the Soils section of the Department of Agricultural Research - Lesotho**

The Department of Agricultural Research through soils section is undertaking research studies on maize and beans varieties. The studies started in 2018 summer planting season. In order to fully involve farmers on these on-going studies, on-farm approach is used. The overall objective the studies is to evaluate two bean cultivars for biological nitrogen fixation and two maize cultivars for nitrogen use efficiency. This is done to restore the fertility of selected soils and crop productivity in an effort to help the farming community realize increased yields.

### **Study on two bean varieties**



It is known that nitrogen deficiency is among the most limiting factors for increased crop yield and management of nitrogen inputs is a major challenge for increased agricultural production. Although application of inorganic fertilizers helps to address the limitations of essential nutrients, most resource-poor farmers cannot access the fertilizer due to financial constraints as they come at a high cost. In Lesotho, farmers do not apply the recommended fertilizer rates for grain due to high costs resulting in large yield gap compared to yield potential. Two bean varieties are used (Pinto Nodak and NUA 45 “*lebeta*” local name) to determine the best variety in nitrogen (N) fixation and yields on farmer-managed fields and research stations.

The current findings indicate that Pinto Nodak yields higher compared to NUA 45 although the latter was found to be more nutritious in terms of iron (Fe) and Zinc (Zn) as compared to Pinto Nodak. The protein content as reflected by total nitrogen in NUA 45 grain was higher compared to Pinto Nodak, showing the higher efficiency of NUA 45 in utilizing the available N in the soil. In addition to the nutritional composition of NUA 45, farmers at both Machache and Sakoane where the research study is conducted reported better organoleptic taste of NUA 45. This may suggest that Pinto is better for food security (food quantity), while NUA 45 could be better for nutritional quality. As such farmers may need to produce both varieties to satisfy food and nutrition requirements. The food and nutrition security benefits of bean varieties will be associated with soil fertility through biological nitrogen fixation. The final results of these studies will be released after the third summer cropping season of 2021.

### **Study on two maize varieties**



There is a need to improve productivity of the main staple crop through growing maize varieties that efficiently use nitrogen (N) for the benefit of farmers who usually apply insufficient fertilizer rates. The two maize genotypes, ZM 521 and

ZM 523 have been introduced to farmers in Lesotho because of their ability to tolerate drought. They can produce high yields under water-stressed conditions and they are open pollinated varieties although they differ in maturity by 20 days with ZM 523 maturing later. The second research study focuses on the nitrogen use efficiency (NUE) and yields on farmer-managed and research stations. The study is carried out in the lowlands and foothills of Lesotho because maize generally perform better in these Agro-ecological zones. The current results reveal that ZM 523 has higher grain yield compared to ZM 521 although nitrogen use efficiency of the two varieties is almost the same. ZM 523 could be recommended to the farmers in the lowlands and foothills because of its ability to accumulate more Nitrogen in whole plant which can benefit both food, nutrition and environmental security, ensuring more food and feed availability to humans and livestock and NUE to avoid leaching of N to the environment.

Apart from undertaking research activities, the division is carrying out soil tests. It is important for the farmers to note that the best time to take soil samples for analyses is in winter after harvest for field crops before planting other crops. However, for vegetables and other short circled plants soil analyses can be undertaken before introducing the succeeding batch.

**Written by:** *Department of Agricultural Research - Soils section*