BEST MANAGEMENT PRACTICES
VEGETABLE PRODUCTION

MOHALE'S HOEK DISTRICT IN LESOTHO

LENAFU & GREEN VALE CHAINS

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1.1 INTRODUCTION

Agricultural Best Management Practices are an industry driven effort to maintain agricultural production in a profitable, environmentally sensitive and sustainable manner. Best Management Practices (BMPs) are site specific, economically feasible practices that are applied by farmers while accounting for environmental and public health impacts. BMPs are not meant to be regulatory as every farm operation and site is different and may require special practices. But BMPs are meant to provide guidance as to practices that farmers can strive towards implementing on their farms. BMPs can be classified as source, structural, cultural, or managerial controls.

- Source controls include restriction or removal of a particular pesticide or nutrient source with high likelihood of polluting the environment.
- Structural controls are physical measures designed to prevent water and sediment movement or to prevent the exposure of pigs to disease causing organisms by reducing introduction and spread of pathogens into and between the farms.
- Cultural controls are cropping and tillage practices that minimize pest problems and maximize nutrient use efficiency by soil conservation and crop rotations.
- Managerial controls are strategies and tools adopted by growers that consider both environmental and economic impacts.

1.1.1 Objectives of BMPs in Vegetables

The implementation of BMPs in vegetable production by farmers in Mohale's Hoek will guarantee the sustainable use of soil and water resources and to increase the share of renewable and recycled resources at the input side of the value chain. It will also maximize material and energy efficiency at each stage of the process, and reduce negative environmental impacts as outputs at all points of the chain.

2.0 METHODOLOGY

Vegetable producing farms were visited and farmers were interviewed using face to face with open ended and closed ended questions. Observations were also recorded on implementation of BMPs.

2.1 Scoring

The Best Management Practices in vegetable production were assessed and scored using criteria below;

1. Poor or Unacceptable Implementation of Best Practices
2. Average Implementation of Best Practices
3. Good Implementation of Best Practices

2.2 Criteria used for Assessment

Vegetable Production Best Management Practices were evaluated based on the following standards or criteria;

- Use of tunnels/ green house or open field
- Well-drained soil and good topography
- Access to irrigation water
- Use of improved seeds
- Soil testing to determine nutrient status
- Soil compost to improve soil structure
- Production & Productivity
- General management; weeding & irrigation
- Soil Conservation Practices
- Crop rotation and cover crops
- Mulching, row covers
- Integrated pest management
- Vertical farming
- Environmental protection
- Marketing & Handling
- Record Keeping

2.3 Visited farms

2.3.1 Mamorena Seqao

Mamorena Seqao farm is practicing Machobane farming system which protect the environment, minimize soil degradation and erosion, optimize biological productivity and promote a sound state of health. This organic farming promotes maintenance of long-term soil fertility by optimizing conditions for biological activity within the soil.

Figure1: Mrs Mamorena Seqao

2.3.2 Lefu Poone

Mr. Poone is specializing with cabbage production. He however reported that he planted other vegetables to fill the land when cabbage is not enough. Currently he is producing cabbage, beetroot, tomato, carrots and leafy greens.

Figure 2: Mr Lefu Poone

2.3.3 Sempe Lebona

Started farming around the year 2010, however there were more challenges that stalled the productions such as poor yields, diseases, poor soil fertility and irrigation. Mr Sempe had to consult Ministry of Agriculture Extension Services in order to improve productivity. The farm is currently producing a range of vegetable such as tomato, green pepper, onion, beetroot and carrots.

Figure 3: Mr. Sempe Lebona

2.3.4 Thoriso Monenane

Mr Monenane started vegetable production around 2017 with small homestead garden which was not profitable enough to meet his needs. Mr Monenane eventually left the

country in search for livelihood in the Republic of South Africa which proved to be unsuccessful and he had to return back. He then continued where he left but this time he hired a small field from which later received communal funding in terms of irrigation equipment and hoses but this group work was not sustainable and during its breakaway he was able to get his share of irrigation hosepipes which saw him growing into a productive farmer. Having ripped the benefits of increased production he received another funding from government project which provided him with two shade nets and the business had now grown bigger and profitable.

Figure 4: Mr Thoriso Monenane

3.0 FINDINGS

3.1 Crop Production

3.1.1 Use of tunnels/ green house or open field

All farmers are producing their vegetable under the tunnel/ greenhouse as well as in open field. Farmers supported that tunnels protects vegetables against hail and frosts and also extend growing season for crops.

Figure 5: Mr Lebona vegetable production tunnels

3.1.2 Well-drained soil and good topography

The majority of farms are placed in well drained clay loam soil rich in organic matter. Fields are placed in a slightly sloppy area to reduce incidence of water logging.

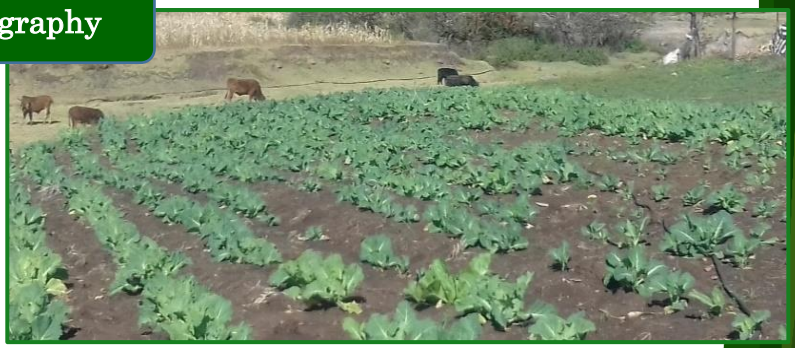

Figure 6: Mr Poone well placed field with fertile soil and moderate slope

3.1.3 Access to irrigation water

The majority of farms have water installation or else water is piped from nearby stream which ensures that crops are irrigated when moisture content of the soil is low. The use of drip irrigation is also common amongst the farmers and this type of irrigation aligns well with BMPs for vegetables because it conserves water.

Figure 7: Use of drip irrigation by Mrs Seqao

3.1.4 Use of improved seeds

The use of high yielding and improved seeds by vegetable farmers should be applauded. Farmers are using Green Coronet, Green Star and Cape Spitz varieties for cabbage. In tomato production they are using Rhapsody and Trinity. California Wonder is favorite for green paper production. Farmers confirmed that Trinity variety can thrive well under greenhouse farming or open field farming. Improved seeds are also resistant to diseases.

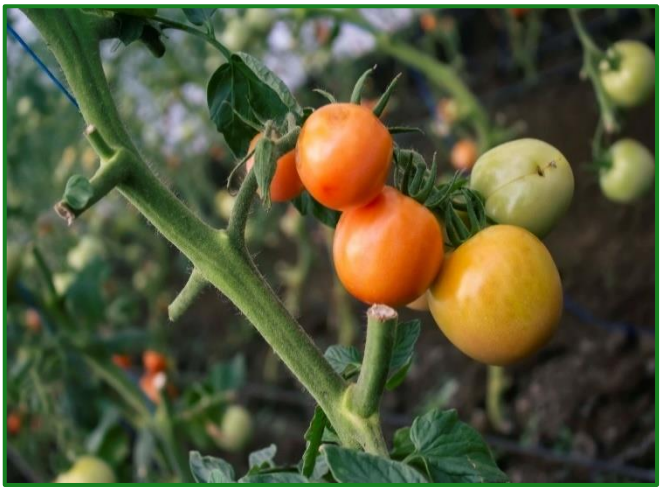

Figure 8: Rhapsody tomato variety

3.1.5 Soil testing to determine nutrient status

The practice is not well adopted by the majority of vegetable farmers. Mr Sempe is ensuring that he apply the right quantity of manure to match soil status. The farm achieves this by doing soil testing at Department of Agricultural Research. Mr Monenane has once tried it but never got feedback.

3.1.6 Soil compost to improve soil structure

The use of kraal manure as compost is very common and well adopted by farmers. The majority of farmers reported that the practice has

improved their soil structure and fertility to the extent that they no longer use spade to plough the soil. They ensure that plants receive balanced nutrients by supplementing their soils with NPK and LAN fertilizers. Mr Sempe uses calcium nitrate to improve the fruit quality of tomato.

3.1.7 Production and general management

The carrying capacity of tunnels enables farmers to plant a maximum of 1200 seedlings. Mr Monenane and Sempe specified that they are planting tomato and cabbage within the carrying capacity of 1200. Mr Poone on the other hand targets about 4000 heads for each variety of Green Coronet and Cape Spitz cabbages. Mr Sempe is also producing butter nut at the rate of 1000 seedlings per growing season. Farmers' production is good when considering sales price.

Routine management practices are very important in ensuring that optimum plant growth is achieved by controlling pests, weeds and post emergence fertilization and they are all important BMPs to guarantee harvest. All farmers are working hard to carry out routine management such as irrigation, weeding and pest control and thinning.

Figure 9: Mr Monenane managing his cabbage plants

3.1.8 Soil Conservation Practices

The adoption of soil and moisture practices in vegetable production will ratify the importance of BMP in sustainable production. Mrs Seqao is practicing crop rotation and use of cover crops in order to improve soil fertility, nutrient availability, moisture conservation and weed control. Her common rotation being leafy crop, root crop and fruit crop. The farmer is also using eragrostis mulch to conserve and suppress weeds. Mr Sempe accentuated that he planted the same plants in same place and he breaks disease cycle through chemical fumigation.

Figure 10: Mulched seed bed to conserve moisture

3.1.9 Integrated pest management

Pests control is very important because without it farmers can lose tons of crops. Common pests and diseases attacking vegetables include bagrada bug, diamondback moth, rust and leaf blight. Mrs Seqao controls major pests attacking cabbage, tomato and other leafy green vegetables by the use of local concoctions and minimize use of chemicals. Mr Poone, Sempe and Monenane specified that they use pesticides and fungicides to control and treat pest damage. Mr Monenane use herbicides for control of weeds but he is no longer using it due to their unavailability and resort to mechanical control like hoeing which is environmentally friendly.

Figure 11: Knapsack used during spraying to control pests.

3.1.10 Vertical farming

Tomato trellising practice by itself supports BMP to utilize small available space effectively and profitably through the use of vertical space. The majority of farmers are producing tomato in this manner.

3.1.11 Environmental protection

Farmers are using a number of techniques to protect their environment and minimize soil and water loss. These includes terraces to minimize soil erosion in sloppy areas, use of organic manure, drip irrigation, minimum tillage and soil tests to minimize nutrient pollution by applying only requirement amount.

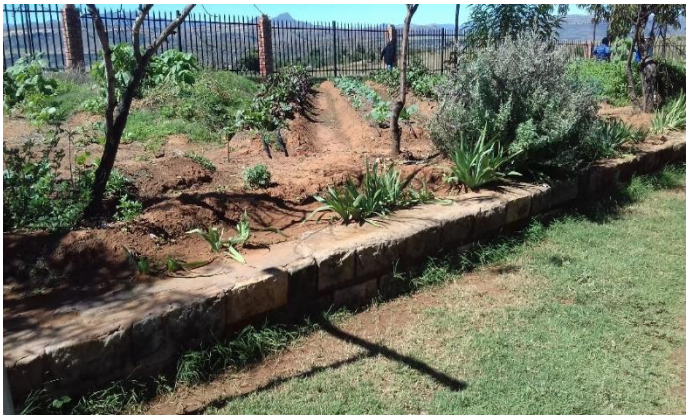

Figure 12: Stone bunds protecting soil from erosion

3.1.12 Marketing & Handling

All farmers market and sell their produce locally and in Mohale's Hoek town to street vendors and Maluti farm produce. Due to lack of storage facility, farmers are forced to harvest and sell at same time. The selling price for Cape Spitz is at M10.00 per two heads while Green Coronet is offered at M10.00 per head. The box of tomato sells between M50.00 and M60.00, Green Pepper bucket for M70.00 while a bag of Butternut sells for M35.00 and M45.00 per 7kg and 10kg

respectively. The farmers reported that market is not very good sometimes despite their high quality vegetables. The farmers on the other hand, have no quality standards to regulate their produce.

3.1.13 Record Keeping

Record keeping is one standard well implemented by all farmers even though some are not very happy with the way they are keeping them. The farmers are keeping production, sales and purchases records.

3.2 Support Services

3.2.1 Training & Extension Support

Farmers are working with the extension services for guidance. Mr Monenane confirmed that he received some training on vegetable production but pointed out that extension services should continue to update them with the latest technologies on vegetable production.

Figure 13: Mamorena in the company of Mekaling Resource Centre staff

3.2.2 Financial Support

The farmers reported that there is no financial assistance to help them boost their businesses. However, farmers individually have benefitted from donors in the form of farm inputs and assets to improve their production.

3.2.3 Marketing Support

Market services are dominated by pick up system where consumer comes to the farm and pick their vegetables. However, other services such as processor, cold storage and wholesalers and bulk traders are not there and farmers struggle to sell their good quality produce.

4.0 DISCUSSIONS

4.1 Vegetable Production

4.1.1 Use of tunnels or green house

The majority of farmers were producing their vegetables under green house and tunnel while portion of the crops were planted in the open field. Vegetable production under the cover is beneficial because it extends the growing season and protects crops from adverse weather conditions such as hail and cold temperature.

4.1.2 Soils, topography and irrigation

Vegetable production farms are well placed in the area with good topography and moderate slope for good drainage. Vegetables are produced with good soils rich in organic matter and well drained. Optimum vegetable production is achieved on well-drained sandy loam soils. Although vegetables can be grown on a wide range of soil types, most vegetables are not well adapted to heavy clay soil types.

Access to irrigation water was good because most of the farms were placed near water sources such as river, stream and dams. Some farmers also had underground water installation for irrigation purposes. Water is the life-blood of vegetable production and it increases the uniformity of emergence and final stand of seeded crop. Vegetable crops generally require more total water and more frequent irrigation than most other agronomic crops.

4.1.3 Improved seeds

Almost all farmers did very well because they were using improved seeds in the form of hybrids. Varieties like Green Coronet, Cape Spitz, Rhapsody, California Wonder, Green Star and Trinity were used in the production of cabbage, green pepper and tomato. Hybrid seeds are high yielding and resistant to a number of diseases. Farmers however, reported the unavailability of improved seeds locally so they are forced to travel to Maseru and Republic of South Africa to obtain them.

4.1.4 Soil testing and manuring

Few farmers do soil testing in order to inform soil nutrient status and fertilizer application. Right fertilizer application plays an important role in reduction of nutrient leaching to the environment and ground water. Farmers are utilizing their soils resource efficiently by replenishing it with organic manure and compost for improved soil structure and fertility. Some farmers reported that they utilize a mixture of crop residue and kraal manure for composting and this contribute significantly towards nutrient recycling. A fertile soil provides essential nutrients for plant growth, to produce healthy food with all the necessary nutrients needed for human health. Such soils are also resist erosion due to good structure and this is an important BMP for soil conservation.

4.1.5 Production and management

Vegetable production yields and quality of cabbage, green pepper and tomatoes and other leafy greens were quiet good as a result of proper management practices applied by farmers such as cultivation, irrigation, application of fertilizers, control of weeds, diseases, and insects, protection against frost and the application of growth regulators. Producing cabbage and tomato under protection also influenced the high yields and quality.

4.1.6 Soil and moisture conservation practices

Soil conservation to ensure sustainable use of a resource is well catered by some farmers who employ a number of practices to ensure that no soil is lost from their production site. The common soil conservation practices used included; crop rotation, reduced tillage, mulching, cover crops and cross-slope farming. On the other hand, some vegetable producers did not do very well when it comes to soil conservation practices such as crop rotation, cover crops, mulching and row covers. When asked about benefits of soil conservation practices they were familiar with them and they promised to implement them.

Farmers reported that these practices help to reduce a build-up of crop-specific pest and disease, improve soil fertility, water quality, and help manage weeds. In this manner farmers are ripping of soil nutrients for plant benefits and later they are replacing the nutrients by implementing the above mentioned practices and thus conserving the soil for future use and the exact goal for BMPs and environmental protection.

4.1.7 Marketing

Marketing of vegetable was well understood by farmers even though the majorities were using farm gate approach with little effort on advertising their produce. The other observation was that the majority of farmers did not do market search prior to planting and this led to loss of produce not reaching the market. Farmers reported that street vendors in Mohale's Hoek and one vegetable wholesaler bought their produce. Despite the challenges, farmers reiterated that vegetable production is their chief source of livelihood and income generating activity.

4.1.8 Records keeping

Record keeping for vegetable production was not well implemented by the majority of farmers who indicated that their records are vague and not done systematically hence are not reliable. Good farm record-keeping helps the farmer plan and do realistic forecasting. Record-keeping provides valuable information on which methods

work. The farmer can better predict price changes of inputs and produce from expenditures and sales records kept from previous years.

4.1.9 Advance technology

The use of advanced technologies was differed by farmers as a future plan to improve their productivity performance.

5.0 Conclusion And Recommendations

5.1 Successes

- Profits helped in the construction of a house.
- The farmer now owns a land for farming including two green houses and borehole
- Vegetable production is a source of livelihood and employment
- Farmer acquired livestock such as pigs and cows through vegetable production
- Able to meet households needs and pay school fees for children

5.2 Challenges

- Too much rain affected production
- Poor record keeping
- Lack of cold storage for vegetables
- Poor market infrastructure for vegetables
- Town market is too far and transport costs very high
- Lack of financial services to support vegetable farming
- Poor participation of youth and women in vegetable production

5.3 Conclusion

Vegetable farmers in Mohale's Hoek district are implementing BMPs with a great success where they attained an overall performance of 85% despite the lack of financial support and marketing outlet. The farmers need to work hard on soil conservation practices and records keeping. Farmers are challenged by lack of cold storage facility, poor market infrastructure for vegetable, poor records keeping and the high rain fall that affected the whole country.

5.4 Recommendations

1. Ministry of agriculture and private sector need to develop a well-structured marketing facility for vegetable production similar to Tikoe at Thetsane in Maseru and Tsikoane in Leribe.
2. Ministry of Agriculture and private sector to invest and improve vegetable value chain in Mohale's Hoek thereby improving service delivery for benefit of farmers such as marketing outlets, inputs suppliers, financial and training services.
3. Ministry to continue good effort of providing training and refresher courses for farmers.
4. Farmers are recommending youth and women to participate in vegetable production because it can improve their livelihoods and provide source of income and food security.

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