

2 - 4 April 2025 | Manthabiseng Convention Centre Maseru, Kingdom of Lesotho

E WORLD BANK

Impact of seed health status on potato (*Solanum tuberosum L.*) tuber yield and tuber quality

Keneuoe Nketsi*, Sebitsa Machela and Lekota Moleboheng

Department of Crop Science, National University of Lesotho

Introduction

- Seed selection and planting clean, disease-free potato quality seed is the first step to a successful cultivation of potato to achieve optimal potato yields and ensuring the production of marketable tubers (Asnake *et al.*, 2023).
- Increase in potato acreage and yield demand for improvement of the quality of seed potatoes supplied to the ware potato production systems as the quality of the seeds has a significant impact on yield and the value potential of crops (Zhang *et al.*, 2023).
 - The locally grown seed tubers are not certified and have higher chances of seedborne disease. Seed-borne pathogens can persist on or within seed tubers and are easily transmitted from one growing season to the next, making them difficult to control.



2 - 4 April 2025 | Manthabiseng Convention

Introduction cont..

- However, some imported seed tubers are certified and appear to be the most reliable and economical quality seed even though its prices are higher.
- Hence, the study examines the impact of microbial pathogens on progeny potato tuber quality, yield and yield components of potato seeds supplied to smallholder farmers in Maseru



Materials and Methods

Uncertified potato seed tubers showing atypical diseases symptoms



Experimental design

Experiment was laid out in CRD with 5 replications and three plants for each symptom

Data Analysis

Data were cleaned and subjected to analysis of variance (ANOVA) using <u>Statistix</u> 10 and Least Significant Difference (LSD) test at 0.05 probability level used to compare treatment means Certified asymptomatic seed tubers



Pot preparation and planting

Collected soil samples from field and Autoclave soil at 121 degrees Celsius and fertilization done at planting

<u></u>

Data collection

The number of tubers per pot was counted and tubers were graded by measuring the diameter. Weight was measured, DI and DSI were determined using formula (Shazia *et al.*, 2014)



2 - 4 April 2025 | Manthabiseng Convention Centre







Results and Discussion

- Effect of seed health on tuber size distribution
- Symptomatic seed tubers resulted into the highest number of small tubers with the mean of 3.8 which was statistically different (P≤0.0004) from the asymptomatic seed tubers with the lowest number of small tubers with (1.00).
- Rahman and Akanda (2010) also confirmed that diseased plant does not perform well like healthy plant as diseases lead to smaller tubers compared to healthy plant.
- Medium and large-sized tuber were higher for asymptomatic treatment.







Impact of seed health on potato tuber weight

- Statistical significant differences in the weight of healthy tubers (p>0.0002) and the total tuber weight (p>0.0432)were observed.
- Asymptomatic seed tubers yielded healthy tubers with the highest mean tuber weight (184.84g) compared to symptomatic seed tubers(74.77g).
- The symptomatic seed tubers yielded the lowest total tuber weight of (122.99g) which might be attributed to the severity of pathogen inoculum on the seed tubers







mpact of seed health on Total number of tubers

- The results showed that total number of tubers per potato plant was significantly influenced by seed health (P>0.0432).
- The highest number of total tubers per plant was observed in asymptomatic seed tuber treatment(9.6) which was statistically different from symptomatic seed tuber treatment(7.2).
 - Huda *et al.*, (2021) also revealed that the maximum number of tuber (8.34) per plant was observed from the certified clean seed, while the minimum number of tubers (5.96) per plant was counted from farmer's own seed potato.





Impact of seed health on disease incidence and diseases severity of potato tubers

- Symptomatic treatment had the highest mean disease incidence (47.60) and severity (35.00).
- Asymptomatic treatment had low mean disease incidences (11.80) and severity (10.60). Indicate that clean seed are less susceptible or tolerant to diseases which may be attributed to its genetic purity.
- Awadalla *et al.*, (2017) revealed that the greatest overall mean disease incidence and severity resulted from the infected seed while planting clean potato seed produced progeny tubers with no disease incidence.







Impact of seed health on disease incidence and diseases severity of potato tubers

- The five diseases identified from visual assessment of potato tubers
- Dry rot caused by *Fusarium oxysporum*, Late blight caused by *Phytophora infestans*, black dot caused by *colletotrichum coccodes*, black surf and elephant hide caused by *Rhizoctonia solani*



Figure 1. Potato tubers exhibiting symptoms of dry rot disease





Impact of seed health on disease incidence and diseases severity of potato tubers



Fig 2. A) Atypical symptoms of Black scurf b) Elephant hide



Fig 3. Atypical symptoms of Black dot



Fig 4. Late blight disease symptoms









Conclusion and Recommendations

- The results of the study revealed that healthy seeds with no diseases symptoms resulted in higher yields and better-quality potatoes, as shown by larger tuber sizes, greater tuber numbers, and higher tuber weights.
- Additionally, healthier seeds exhibited lower disease incidence and severity, indicating that seed health plays a crucial role in managing potato diseases and improving overall potato production.
 - Overall, the findings of the study showed that seed health has a significant impact on yield and quality parameters of potato production that includes tuber weight, tuber size, tuber number, disease incidence, and disease severity on progeny plants and tubers



Conclusion and Recommendations cont..

- Farmers should prioritize certified, diseases-free seed potatoes to improve yields and tuber quality
- Fungicides treatments to control seed-borne diseases
- Establish local seed certification processes to improve the availability of high quality seed



Acknowledgements

- I would like to express my sincere gratitude to my supervisor Dr.
 Moleboheng Lekota, for invaluable guidance and support.
- I also extend my appreciation to National University of Lesotho for providing necessary resources for this research.
- Additionally, I acknowledge National Manpower Development Secretariat for their sponsorship, which made this work possible.

