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The Response Tuber Quality to Selected Potato Cultivars, Different Mulch, Fungicide Applications, under Various Localities

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INTRODUCTION & AIM

The potato tuber quality is influenced by several factors, such as agricultural management practices, environment, growth period, cultivar genetics characteristics, and tuber age (Sim et al., 2023). Furthermore, the high cost of inputs like certified seeds and fertilizer, the use of minimal control of diseases, and lack of knowledge, smallholder farmers opt to use substandard agronomic practices that compromise tuber quality, such as starch, dry matter, and tuber nutrient concentration (Tein et al., 2014). The aim was to determine the effect of integrating cultivars, mulch, and fungicides on tuber nutrition composition quality in selected smallholder settings under different localities. The findings of this study could improve understanding of how the composition of potatoes is affected by agricultural practice management.

METHOD

Field trials were carried out in KwaZulu-Natal, South Africa, at five localities for two seasons in 2022/23 and 2023/24 in Swayimane and Appelsbosch agroecological zones. Gobizembe, Mbhava, and Stezi are located in Swayimane, whereas Hlathikhulu and Mbalenhle are located in Appelsbosch. The factors tested included four potato cultivars (Panamera, Electra, Mondial, and Sababa), dry grass hay mulch, and fungicides applied at two different levels (mulch and non-mulch) and two application methods (sprayed and unsprayed). An experimental plot of 34 plants in two 5 m long rows per cultivar spaced at 0.90 m x 0.30 m and surrounded by border rows of the same cultivar was harvested and used for tuber quality traits assessment in terms of protein, dry matter, starch, and energy. Factorial layout in a randomized complete block design replicated three times at each locality, comprising a total of 16 treatment combinations (ENMS=Electra x non-mulch x sprayed, ENMUS=Electra x non-mulch x unsprayed, EMS=Electra x mulch x sprayed, EMUS=Electra x mulch x unsprayed, MNMS=Mondial x non-mulch x sprayed, MNMUS=Mondial x non-mulch x unsprayed, MMS=Mondial x mulch x sprayed, MMUS=Mondial x mulch x unsprayed, PNMS=Panamera x non-mulch x sprayed, PNMUS=Panamera x non-mulch x unsprayed, PMS=Panamera x mulch x sprayed, PMUS=Panamera x mulch x unsprayed, SNMS=Sababa x non-mulch x sprayed, SNMUS=Sababa x non-mulch x unsprayed, SMS=Sababa x mulch x sprayed, SMUS=Sababa x mulch x unsprayed).

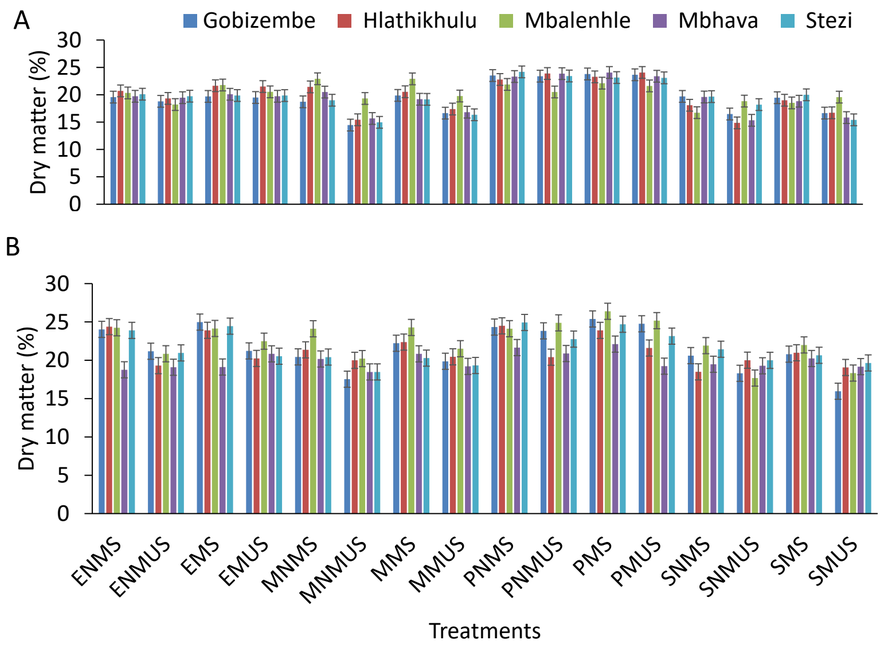

Figure 1: Dry matter content (%) of the four cultivars under different mulch and fungicide applications, for the five localities over two cropping seasons 2022/23(A) and 2023/24 (B).

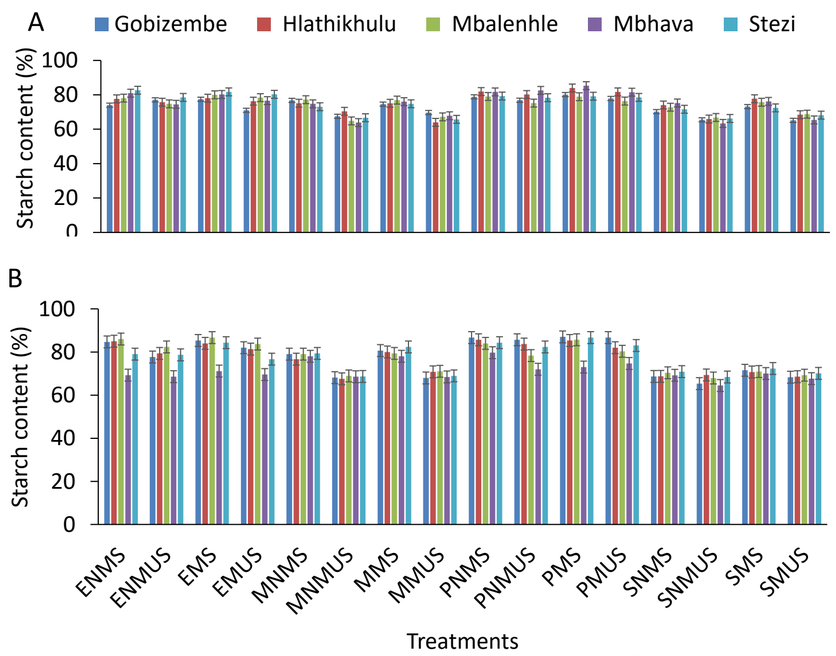

Figure 2: Starch content (%) of the four cultivars under different mulch and fungicide applications, for the five localities over two cropping seasons 2022/23 (A) and 2023/24 (B).

RESULTS & DISCUSSION

- The interaction effect of fungicides, mulch, cultivar, and locality on dry matter, starch content, protein, and energy (Figure 1 – 4) showed an insignificant difference ($p>0.05$) among treatments. Meanwhile, cultivar, localities, and fungicides interaction showed a significant difference ($p<0.05$) among treatments
- The dry matter and starch content tends to change with practices or treatments that are being applied, where diseases were not controlled in the unsprayed and non-mulch treatment produced low starch content and dry matter, hence plants were affected by diseases which led to premature foliage and growth cycle was shortened, whereas in the treatment that was sprayed allow a longer period of the growing cycle and tubers accumulated more assimilates (Sim et al., 2023).
- Protein content was recorded on Panamera x non-mulch x sprayed, Panamera x mulch x sprayed, and Panamera x mulch x unsprayed in Hlathikhulu, Gobizembe, Mbalenhle, Mbhava, and Stezi, respectively.
- All the unsprayed treatments gave low energy compared to sprayed treatments, such that Mondial x non-mulch x unsprayed (MNMUS), Mondial mulch x unsprayed (MMUS), and Sababa x mulch x unsprayed (SMUS) recorded two seasons' average value of 357.21 in Mbalenhle, 360.33 Kcal/100 g and 360.11 Kcal/100 g in Gobizembe and Hlathikhulu, and 360.38 Kcal/100 g and 356.30 Kcal/100 g in Mbhava and Stezi, respectively

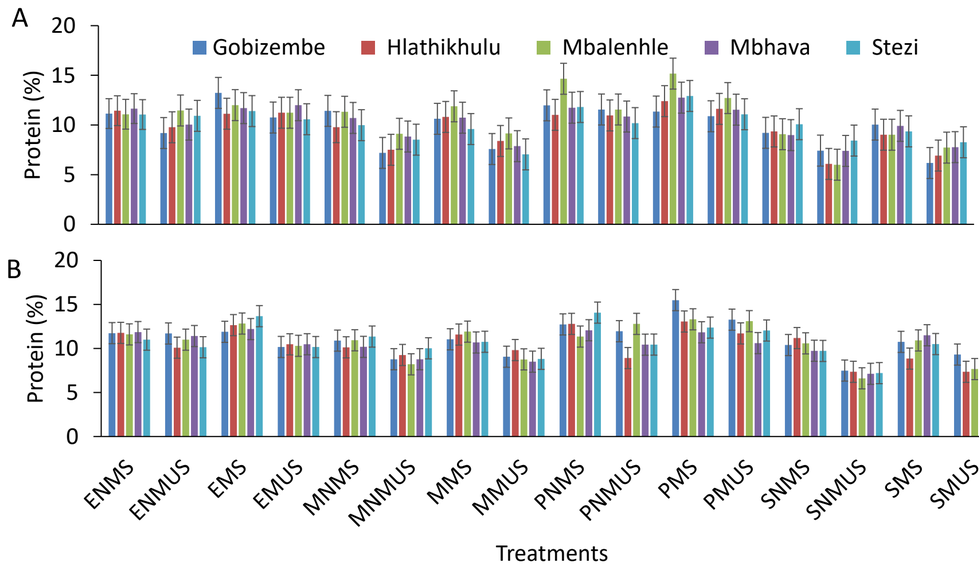

Figure 3: Protein percentage of the four cultivars under different mulch and fungicide applications, for the five localities over two cropping seasons 2022/23 (A) and 2023/24 (B).

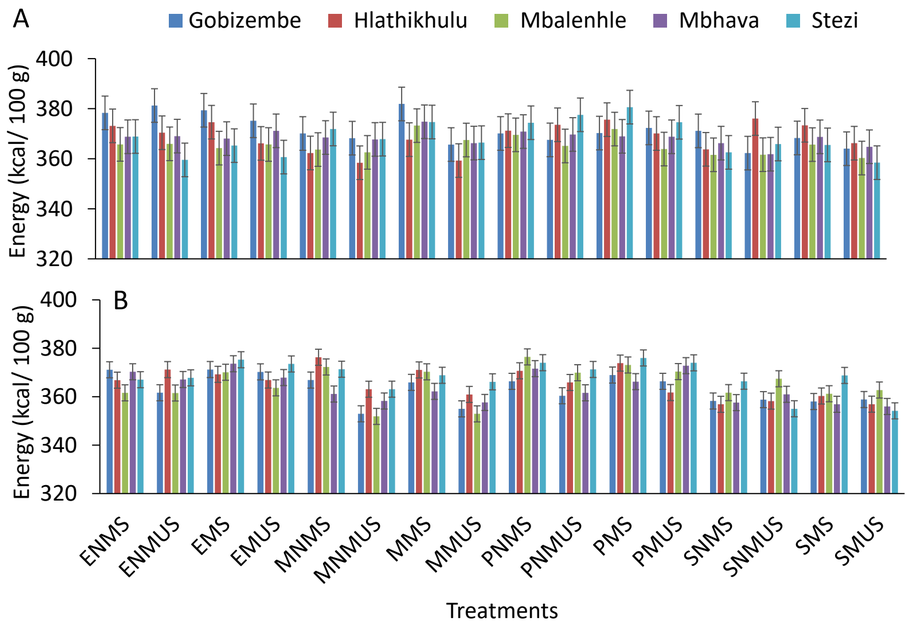

Figure 4.4: Energy of the four cultivars under different mulch and fungicide applications, for the five localities over two cropping seasons 2022/23 (A) and 2023/24 (B).

CONCLUSION

The results revealed that tuber quality slightly varies with management practices being applied, it was noted that in the absence of fungicide application, all the tuber quality traits are reduced, whereas cultivars that were sprayed with fungicides had higher nutritional profiles. Under these localities potato tuber quality can be increased by selecting Electra and Panamera with the application of fungicide.

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