

Assessment of Potato Yield Losses Due to Diseases in Busogo Sector, Rwanda

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Abstract

Potato (*Solanum tuberosum* L.) is one of Rwanda's priority food crops, yet its productivity is constrained by several diseases, notably late blight and bacterial wilt. This study evaluated potato yield losses attributed to diseases under field conditions in Busogo Sector, Musanze District. A randomized complete block design (RCBD) with four treatments and three replications was employed: T1 (Ridomil application), T2 (Dithane application), T3 (Ridomil + Dithane), and T4 (control, no fungicide). Agronomic parameters (plant height, leaf number, and plant diameter) and disease indices were recorded at regular intervals. Percent Disease Index (PDI) was calculated and analyzed statistically using ANOVA. Although no significant differences were observed among treatments for growth parameters ($p > 0.05$), disease severity was reduced by fungicide applications, particularly in T3 and T2. PDI decreased from 49.3% at week 6 to 19.4% at week 9, indicating effective disease control. Estimated yield losses were 26.19%. Preventive fungicide application, especially Dithane, is recommended to minimize disease impacts and improve yields.

****Keywords:**** Potato, *Solanum tuberosum*, disease incidence, fungicide, yield loss, Rwanda, late blight, bacterial wilt.

1. Introduction

Potato (*Solanum tuberosum* L.) is the fourth most important food crop globally after wheat, rice, and maize and is a key component of Rwanda's food security strategy. In Rwanda, per capita consumption is approximately 125 kg annually, making it the second staple food after banana. However, diseases such as late blight caused by *Phytophthora infestans* and bacterial wilt caused by *Ralstonia solanacearum* significantly reduce yields, with national losses estimated between 10–30%. Integrated disease management, including fungicide application, is therefore essential.

2. Materials and Methods

2.1 Study site

The experiment was conducted at UR-CAVM farm, Busogo Sector, Musanze District, Northern Province of Rwanda, during the 2020 A cropping season.

2.2 Experimental design

The study used a RCBD with four treatments and three replications: T1 (Ridomil), T2 (Dithane), T3 (Ridomil + Dithane), and T4 (control). Plot size was 2.3×1.7 m, spacing 70×30 cm, with 20 plants per plot.

2.3 Data collection

Agronomic parameters (height, leaf number, diameter) were recorded every 15 days. Disease incidence and severity were assessed weekly using Wheeler's formula to calculate PDI. Yield estimation was based on healthy vs diseased plants and tuber rot assessments.

2.4 Data analysis

ANOVA was conducted to test treatment effects using R software. Differences were considered significant at $p < 0.05$.

3. Results

No significant differences were found in plant height, diameter, or leaf number among treatments ($p > 0.05$). PDI declined from 49.3% (week 6) to 19.4% (week 9) in T3. Control plots (T4) exhibited the highest disease severity throughout the growth cycle. T3 and T2 treatments effectively suppressed disease progression.

Treatment	Week 6 PDI (%)	Week 9 PDI (%)
T1	47.4	24.6
T2	24.6	19.4
T3	24.4	19.4
T4	49.3	47.4

4. Discussion

Fungicide application significantly reduced disease severity though it did not affect vegetative growth parameters. The higher efficacy of combined applications (T3) suggests potential synergistic effects. However, overreliance on systemic fungicides like Ridomil may increase resistance risks, hence alternating or integrating with preventive fungicides is recommended.

5. Conclusion

Fungicide applications, particularly Dithane alone or combined with Ridomil, effectively reduced disease severity and yield loss in potatoes under Busogo conditions. Preventive control strategies can significantly contribute to food security and farm profitability.

6. Recommendations

- Use Dithane as a preventive fungicide weekly during critical growth stages.
- Apply Ridomil only when disease symptoms appear, to reduce resistance risk.
- Integrate cultural practices (crop rotation, use of clean seed, proper spacing) with chemical control.
- Further studies should evaluate integrated pest management under different agro-ecological zones.

7. References

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