Manejo de doenças foliares na primeira e segunda safra do milho no Paraná, Brasil

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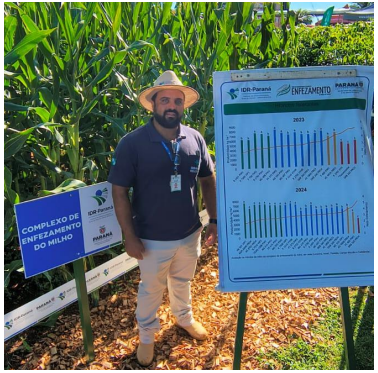
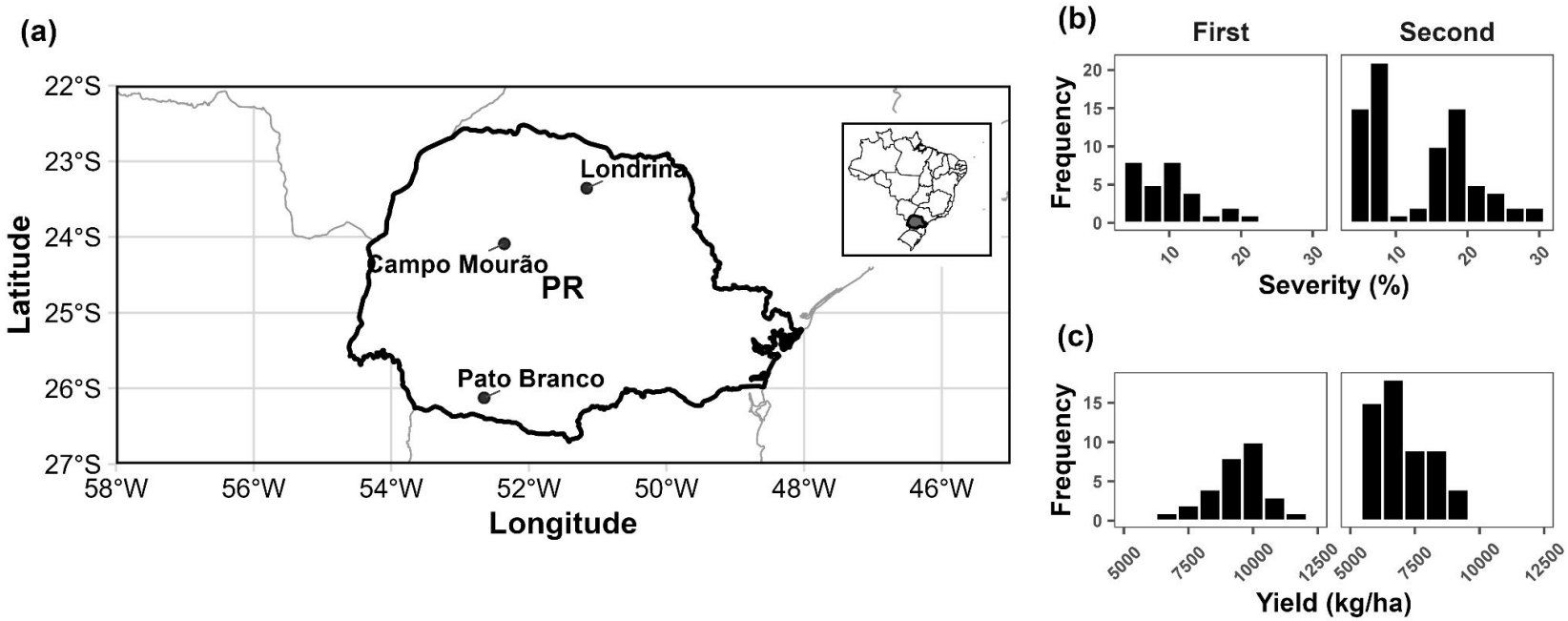
Agradecimentos



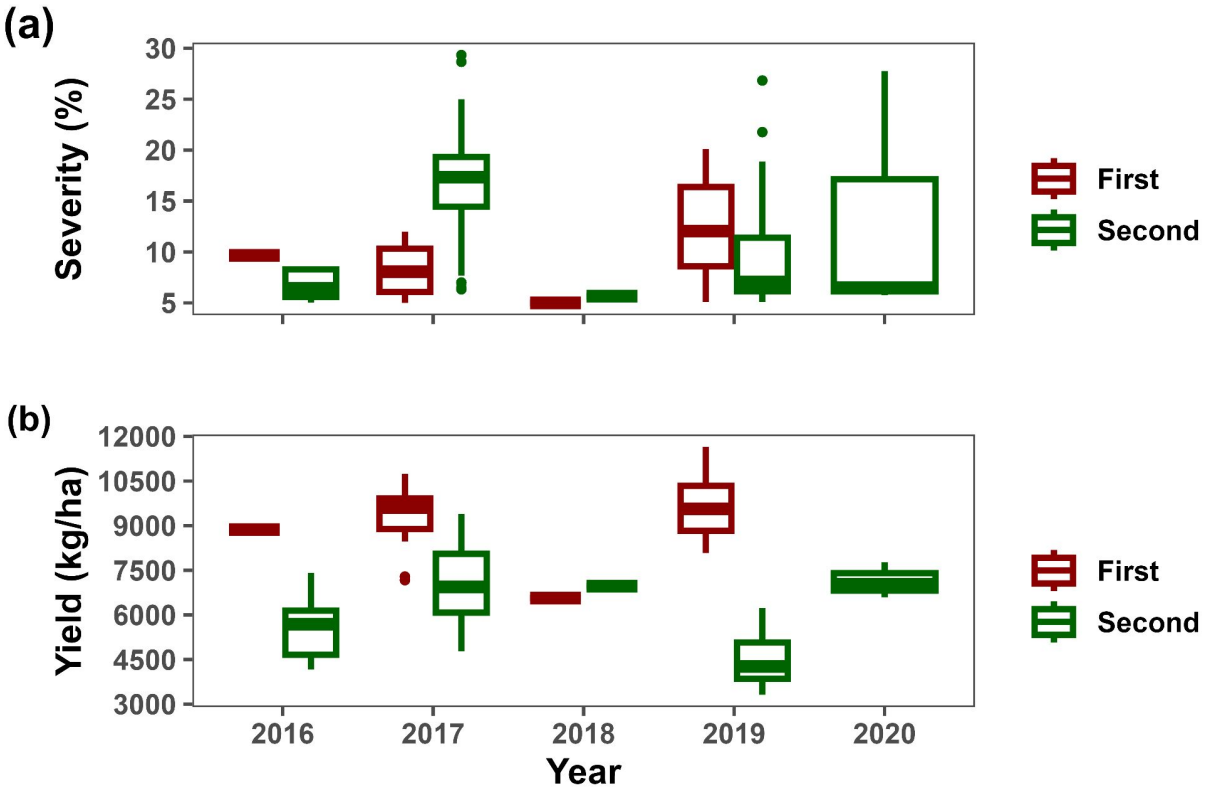
Motivação

O uso de fungicidas como estratégia preventiva sob baixa pressão da doença no cultivo do milho é rentável?

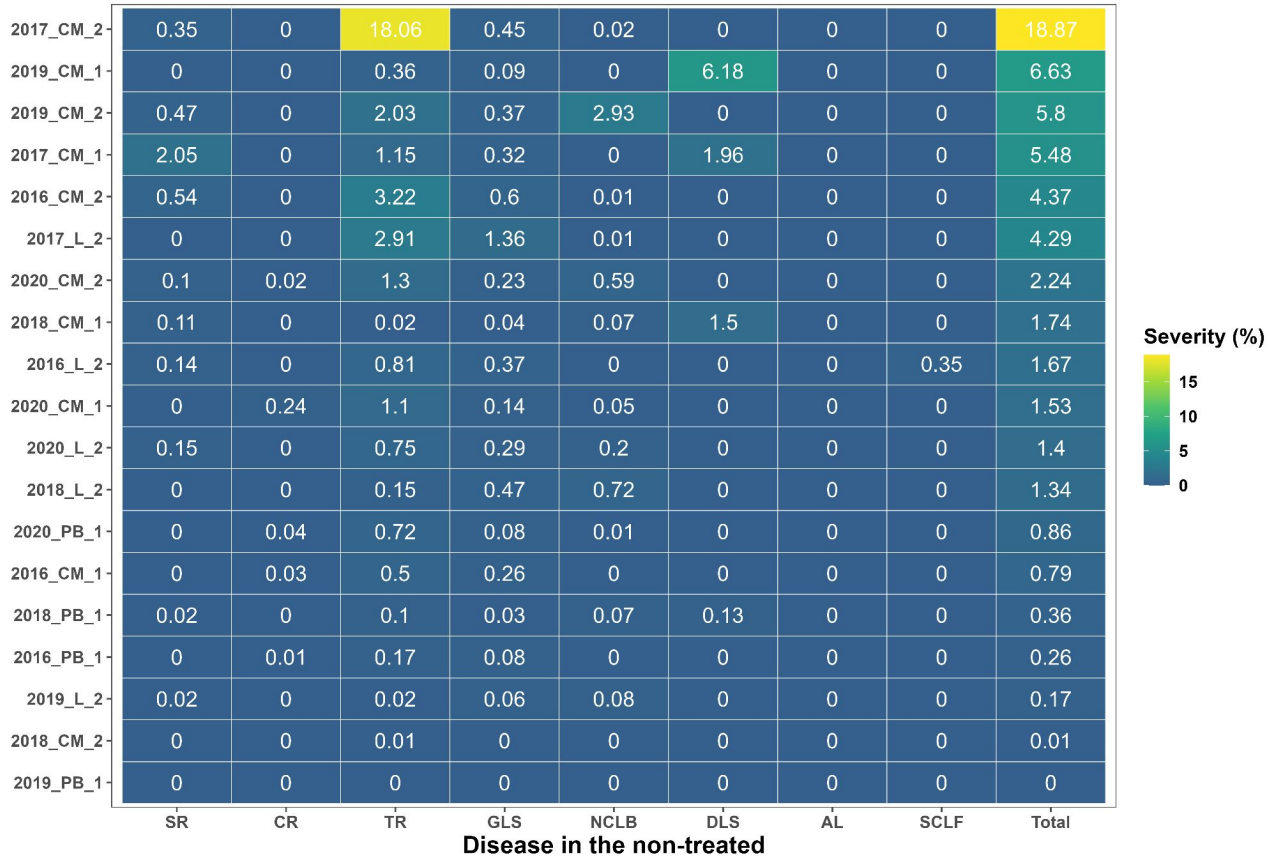
Banco de dados



Resultados


(a)
Severity (%)
30
25
20
15
10
5
First
Second
(b)
Yield (kg/ha)
12000
10500
9000
7500
6000
4500
3000
2016
2017
2018
2019
2020
Year
First
Second

Resultados


2017_CM_2 0.35 0 18.06 0.45 0.02 0 0 0 18.87
2019_CM_1 0 0 0.36 0.09 0 6.18 0 0 6.63
2019_CM_2 0.47 0 2.03 0.37 2.93 0 0 0 5.8
2017_CM_1 2.05 0 1.15 0.32 0 1.96 0 0 5.48
2016_CM_2 0.54 0 3.22 0.6 0.01 0 0 0 4.37
2017_L_2 0 0 2.91 1.36 0.01 0 0 0 4.29
2020_CM_2 0.1 0.02 1.3 0.23 0.59 0 0 0 2.24
2018_CM_1 0.11 0 0.02 0.04 0.07 1.5 0 0 1.74
2016_L_2 0.14 0 0.81 0.37 0 0 0 0.35 1.67
2020_CM_1 0 0.24 1.1 0.14 0.05 0 0 0 1.53
2020_L_2 0.15 0 0.75 0.29 0.2 0 0 0 1.4
2018_L_2 0 0 0.15 0.47 0.72 0 0 0 1.34
2020_PB_1 0 0.04 0.72 0.08 0.01 0 0 0 0.86
2016_CM_1 0 0.03 0.5 0.26 0 0 0 0 0.79
2018_PB_1 0.02 0 0.1 0.03 0.07 0.13 0 0 0.36
2016_PB_1 0 0.01 0.17 0.08 0 0 0 0 0.26
2019_L_2 0.02 0 0.02 0.06 0.08 0 0 0 0.17
2018_CM_2 0 0 0.01 0 0 0 0 0 0.01
2019_PB_1 0 0 0 0 0 0 0 0 0
SR CR TR GLS NCLB DLS AL SCLF Total
Disease in the non-treated
Severity (%)
15
10
5
0

Resultados

Custo (427,2 R$ ha^{-1})
Preço do milho (1000 R$ ton^{-1})

	Efeitos estimados					
Nível da doença	Diferença	CL_L	CL_U	%	CL_L	CL_U
Ausente (≤ 1,6%)	92,55	-239,15	424,26	1,22	-2,93	5,57

-330.14 R$ ha^{-1}

Ausente (< 12%)

Presente (99 %)

Preprint

Preprint | 6 January 2026

When does fungicide use pay off in maize? Evidence from low foliar disease pressure environments in southern Brazil.

Authors: Ricardo Gomes Tomáz, Dionathan Willian Lujan, Adriano Augusto de Paiva Custódio, Daniel Debona, Deoclécio Domingos Garbuglio, Emerson Medeiros Del Ponte | AUTHORS INFO & AFFILIATIONS

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Abstract

Foliar fungicides are widely used in maize production in southern Brazil, yet their economic justification under low disease pressure remains uncertain. We synthesized yield and economic responses to a fungicide program using a random-effects meta-analytic approach based on 19 multi-environment trials conducted across the first (summer) and second (safrinha) seasons between 2016 and 2020 in Paraná State, Brazil. Trials represented realistic, non-epidemic conditions in which multiple foliar diseases co-occurred at low to moderate intensities. Absolute and relative yield responses were calculated from paired treated and non-treated hybrid plots, and moderator effects of disease pressure and season were evaluated. Fungicide application resulted in a significant yield benefit only when disease was present (>1.6% total severity), with an average difference of 835.5 kg ha^{-1} (95% CI: 484.4-1,186.6). Under disease nearly absent (≤1.6%), the yield response was small and highly uncertain (92.55 kg ha^{-1}; 95% CI: -239.15 to 424.2). Sensitivity analysis based on log response ratios indicated a relative yield difference of 10.1% (95% CI: 3.6-17.0%) when disease was present, while effects across seasons were not statistically significant. Economic simulations showed a 99% probability of positive net return when disease was present compared with only 3% otherwise. Our findings indicate that routine fungicide use in maize is unlikely to be economically justified when disease was nearly absent even when modern premix formulations are applied. These results emphasize the importance of disease-informed decision-making and support targeted, rather than preventive, fungicide applications in maize grown under non-epidemic conditions.

Submissão

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