

The Value of FHB Resistance and Other Varietal Characteristics to Saskatchewan Hard Red Spring Wheat (HRSW) Producers

Lampros Nikolaos Maros^[1] & Richard S. Gray^[2]

BACKGROUND

- Fusarium is the worst fungal enemy of wheat resulting in **Fusarium Head Blight (FHB)**^[3]. FHB is a **threat for Canadian wheat**^[4] and it has **negative consequences** for yield and grain quality^[5].



- Saskatchewan (SK) produced **45%** of 2022 Canadian wheat^[8].

- Research funders and wheat breeders must **allocate scarce resources** between the FHB resistance, and other variety characteristics. However, they need to know how producers value FHB resistance relative to other traits.

OBJECTIVES

- Identify **varietal characteristics** that affect the choice of HRSW
- Estimate the **value of FHB resistance and other varietal characteristics** to farmers by incorporating **spatial FHB pressure**

DATA

Field level data & variety choice^[9]

Variety performance data^[10]

FHB incidence data^[11]

- ✓ The final dataset consists of **599,790 observations** from 1998 to 2019

MODEL

Multinomial Logit (MNL) models for each year; from 1998 to 2019

Dependent variable

Bread wheat variety that producer j chooses in field k in time t

1: Variety chosen and 0: Otherwise

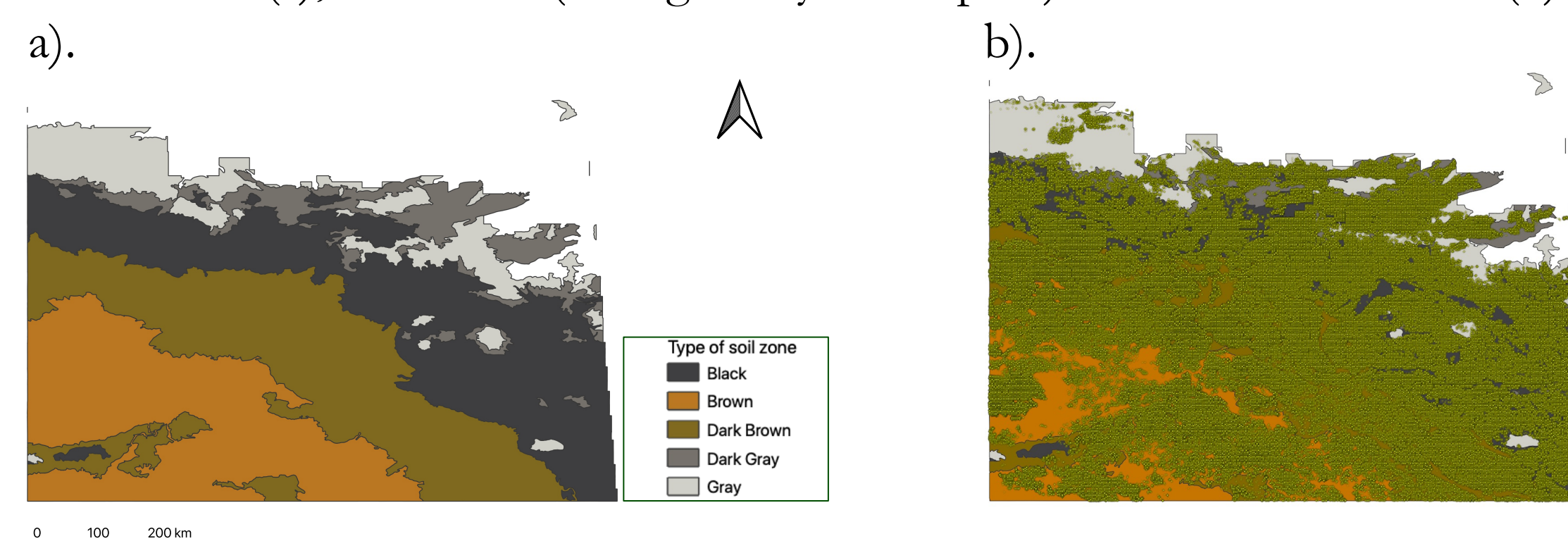
Explanatory variables; varietal characteristics

- Potential yield index (%)
- FHB resistance level
- Lodging resistance level
- Stem rust resistance level

METHODS

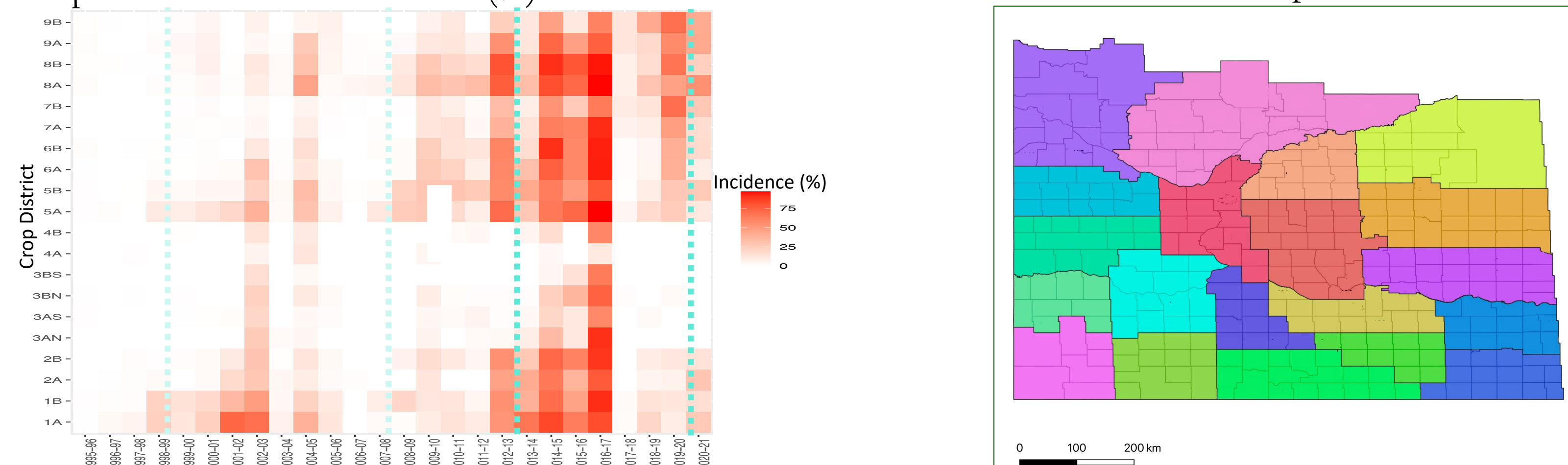
- Variety yield index differs** based on the **soil zone**; use of geospatial software (QGIS) to find the soil zone of the SK fields^[12]

Map 1. Soil zones across SK (a), and fields (with green-yellow spots) across the soil zones (b)



- FHB incidence varies** across the SK **Crop Districts (CDs)** (Map 2); use of QGIS to match fields & CDs^[13]

Graph 1. Annual FHB incidence (%) across the SK CDs^[14]

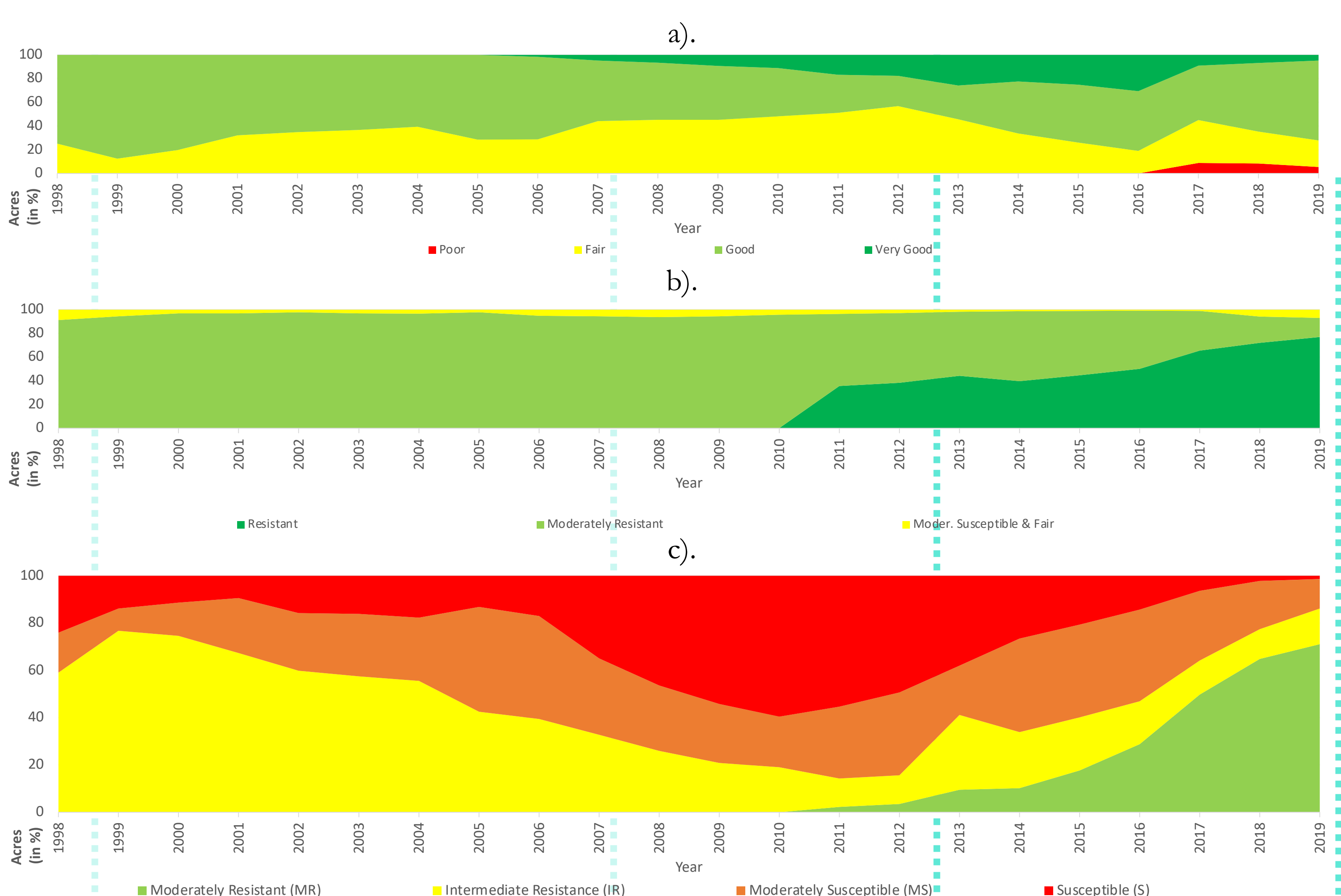


RESULTS

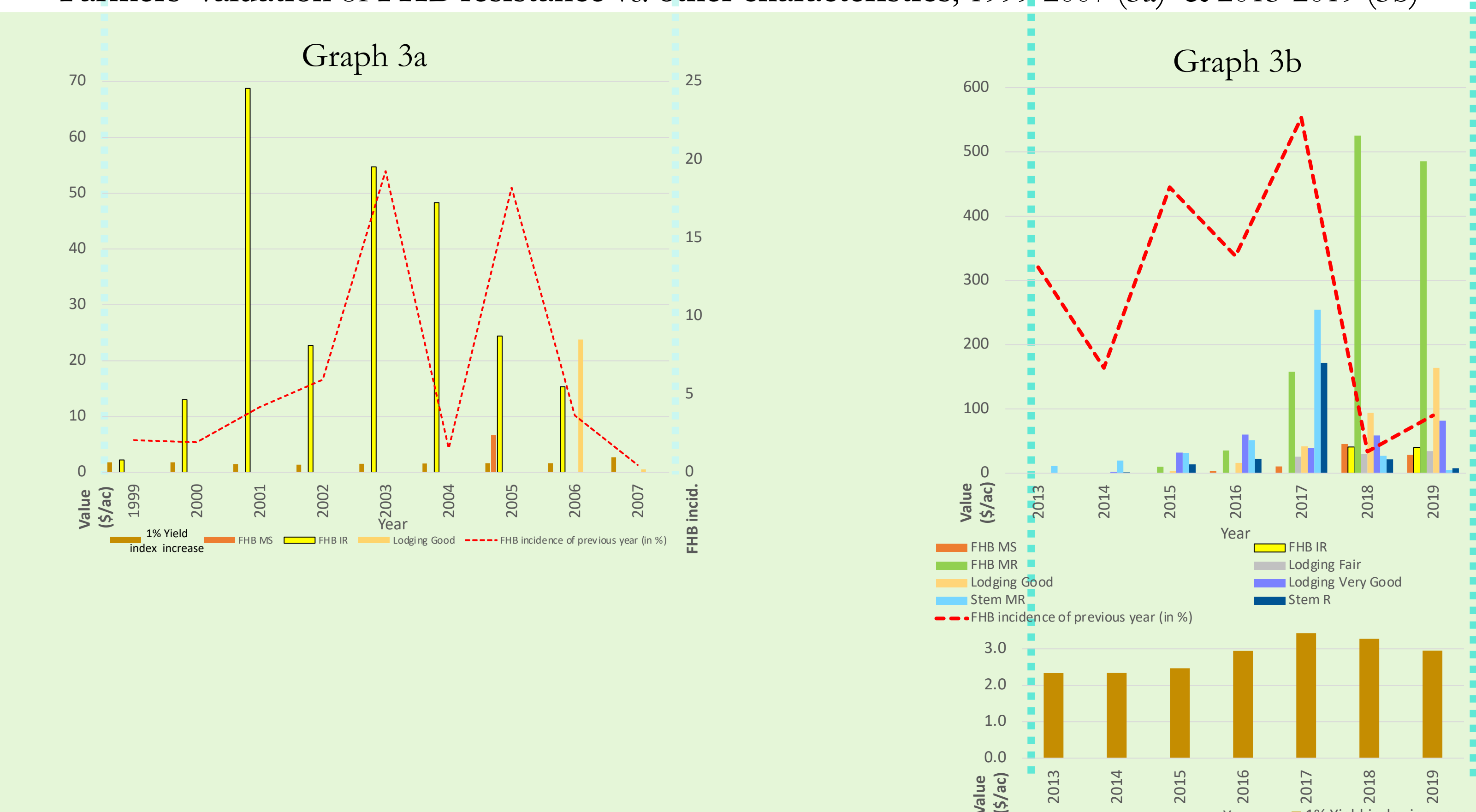
- Varietal factors that affect the choice of HRSW**, depending on the year:

- Yield index
- FHB resistance level
- Lodging resistance level
- Stem rust resistance level

- Graph 2. % of area for **lodging** traits (a), **stem rust** traits (b), and **FHB** traits (c) across years



- Farmers' valuation of FHB resistance vs. other characteristics; 1999-2007 (3a) & 2013-2019 (3b)**



CONCLUSIONS

Two decades of **concerted genomic and breeding effort** resulted in the **development and adoption of the Moderately Resistant (MR) FHB varieties**. This innovation contributes to **SK agricultural supply** by minimizing FHB disruption.

- Producer valuation of the **FHB resistance increases following disease outbreaks**
- The value of the **MR FHB trait is equivalent to a 160% increase in yield index** to farmers 2018

POLICY IMPLICATIONS

- Based on farmer adoption behavior and revealed preference the **value of MR FHB varieties** reached **\$ 4.1 billion (Cdn)** in 2018, two years after the harsh FHB epidemic in 2016
- The **current willingness to pay for disease/pest resistance is not a good indicator** of future valuation
- Rationale for supporting public agricultural research

FURTHER RESEARCH

- High adoption rates of Susceptible FHB varieties** may result to **high FHB pressure**
- Climate change** may increase the value of biotic and abiotic stress resistance
- Perhaps disease and other quality traits can be evaluated in a **real options framework**

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- From Canadian Grain Commission
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- Source of Crop Districts layer: Statistics Canada (see, https://www12.statcan.gc.ca/census-recensement/alternative_alternatif.cfm?archived=1&l=eng&dispecr=zip&teng=gear00b06a_e.zip&k=%20%20%20%2024580&loc=http://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/files-fichiers/gear00b06a_e.zip)
- Source of data: Canadian Grain Commission

FUNDERS

