

Predicting potato yield losses due to Metribuzin sensitivity

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Introduction

- Potato production area - 32000ha in 2016 in ND
- Farmgate value - more than \$210 million
- Fry Processing: 62%
 - Seed 10%
 - Chip 12%
 - fresh 16%

Post-emergence herbicide

- ❑ Limited to metribuzin, rimsulfuron, sethoxydim, and clethodim
- ❑ Most widely used pesticide

“FIRE BRIGADE” ACTION!!!!

Metribuzin for weed control

- 4-Amino-6-(1,1-dimethylethyl)-3-(methylthio)-1,2,4-triazin-5(4H)-one
- Active ingredient in the herbicides Sencor, Tri-cor, Glory, Metribuzin, Metribuzin 75, Omni, etc.
- Controls many broadleaf weeds
- Applied PPI, PRE, POST

Mode of action

- Inhibits photosynthesis
- General chlorosis, interveinal chlorosis and necrosis
- Absorbed by roots and leaves
- Upward translocation

Disadvantages

- Pre-harvest interval-60 days
- Injury potential
- Weather restriction



Fig.: Foliar damage

Objectives

- Screening clones – metribuzin sensitivity
- Evaluate previous model
- Improve model
- Provide information

**Save time,
Money and
labor!!!**

Predictive model

- ❑ Previous model by Love et al. (Am Potato Journal, 1993)
 - Percent yield loss = $(1 - (1.142 + 1.076(\log(\text{plant height injured} / \text{plant height uninjured})) - 0.00796(\text{foliar injury}))) \times 100$

- ❑ Problems
 - Environmental difference
 - Plant height was taken before harvest

Materials and methods (2016)

- Split-block design
- Two replicates
- Standard ND potato production practices
- POST treatment at 20 cm height
- Two herbicide rates
 - Untreated
 - 1 kg ai/ha



Materials and methods (contd.)

- Foliar damage assessed 21 days after application
- Plant height determined prior to harvest
- Total yield obtained following harvest
- Clones screened
 - 20 clones and 6 popular varieties
 - Russet Norkotah- resistant check
 - Shepody- susceptible check

Results (2016)

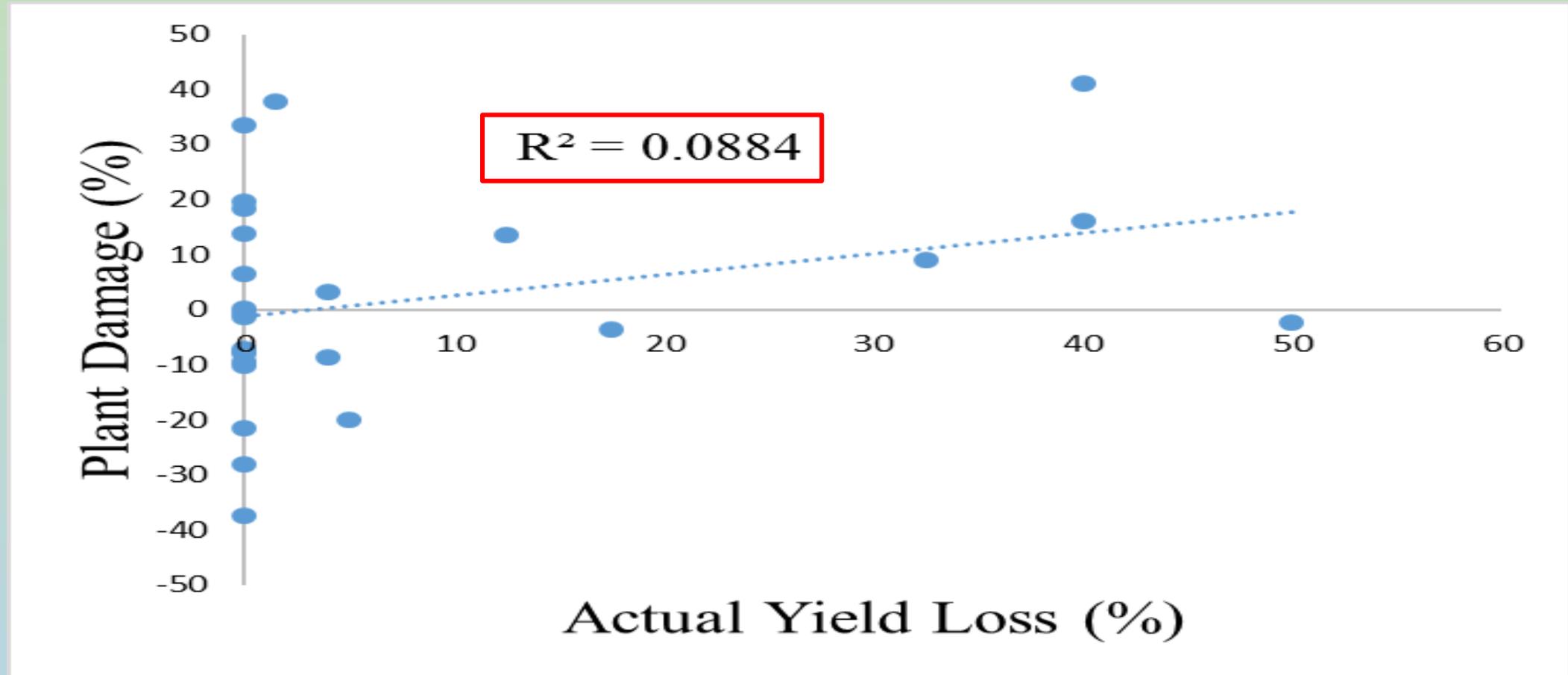


Fig 1: Correlation between plant damage and actual yield loss

Results (2016)

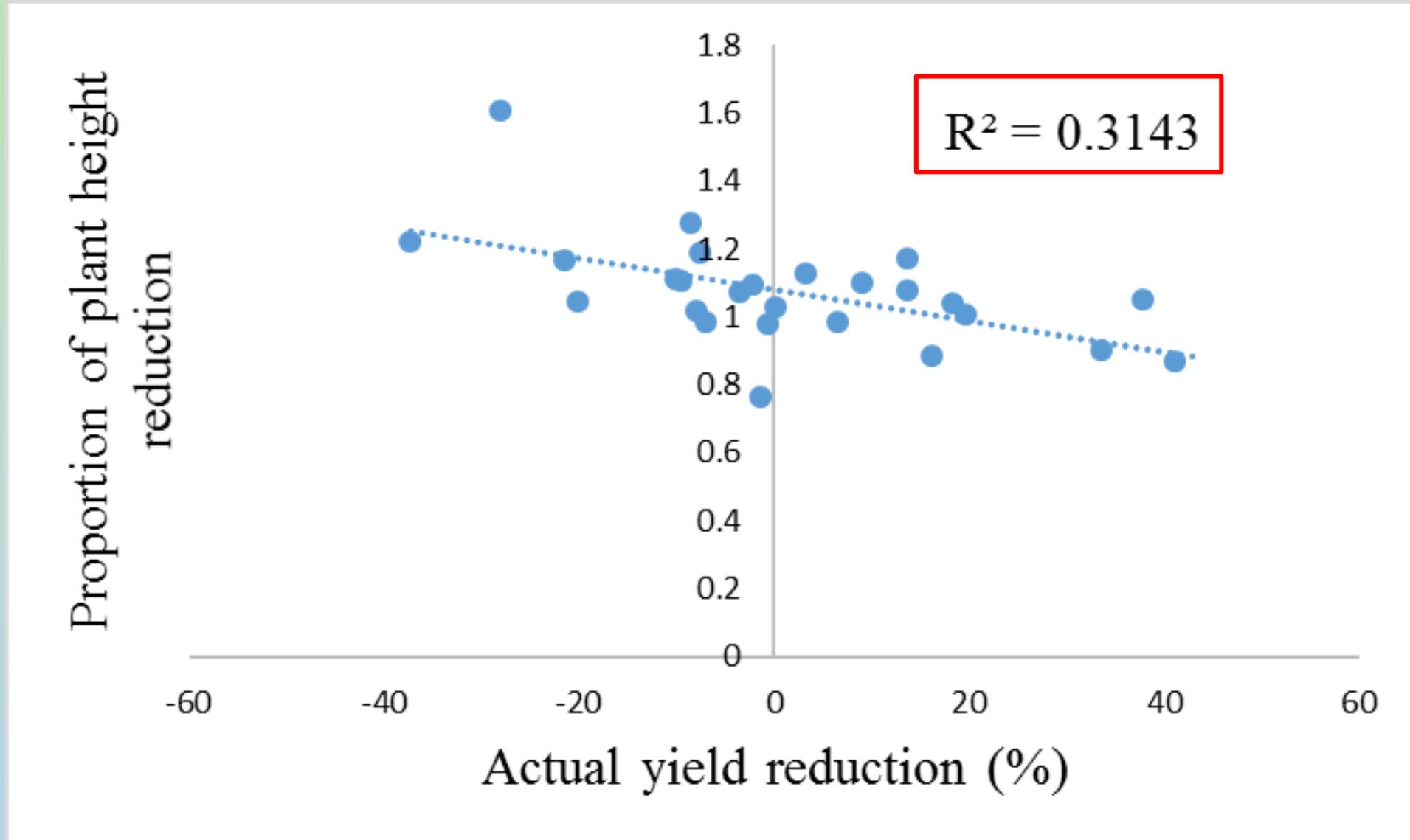


Fig 2: Correlation between relative plant height and actual yield loss

Results (2016)

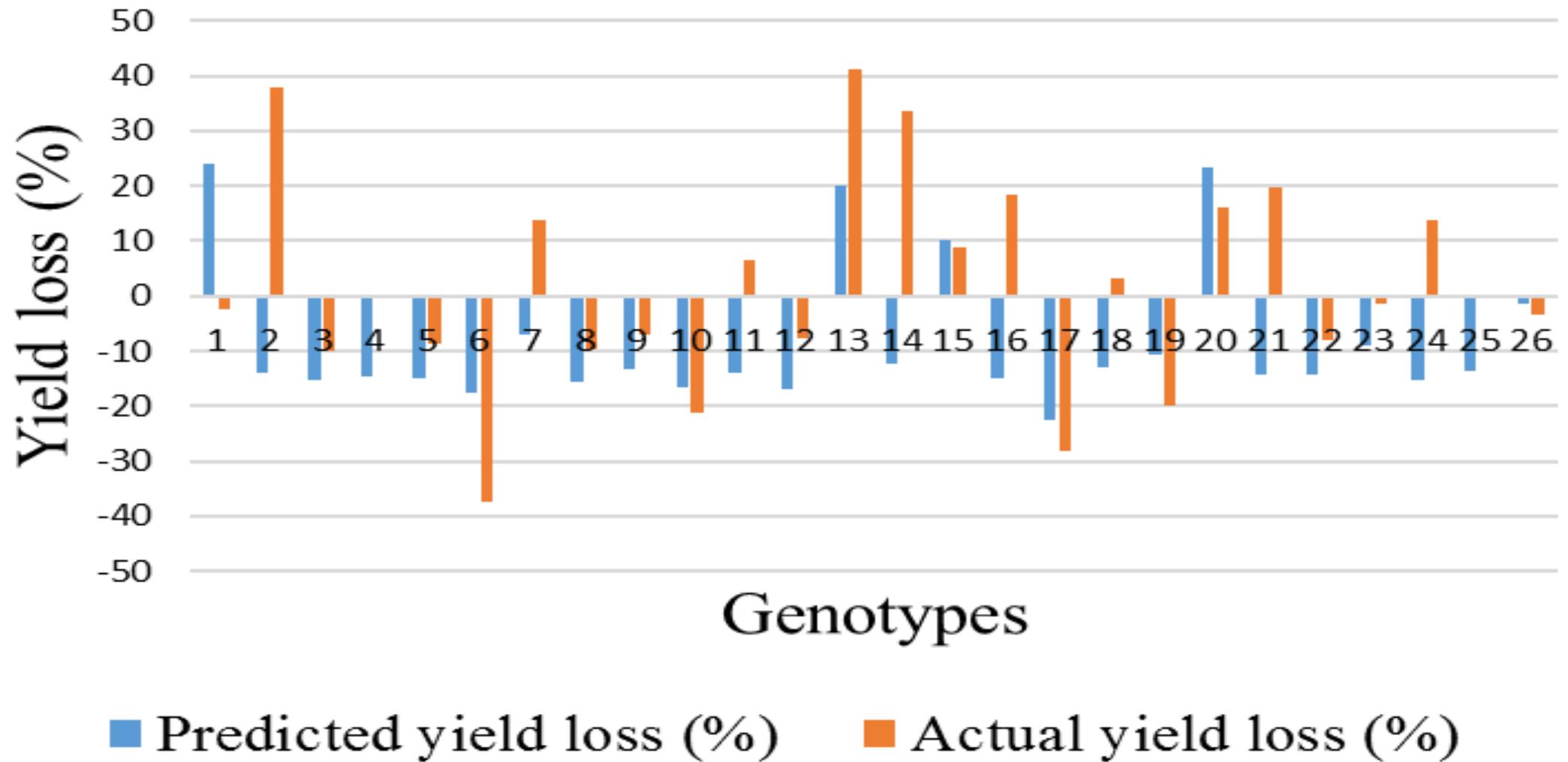


Fig 3: Actual yield loss vs Predicted yield loss

Modifications in 2017

- Three replicates
- Foliar damage assessed 7, 14 and 21 days after application
- Plant height determined 7, 14 and 21 days after application

Results (2017)

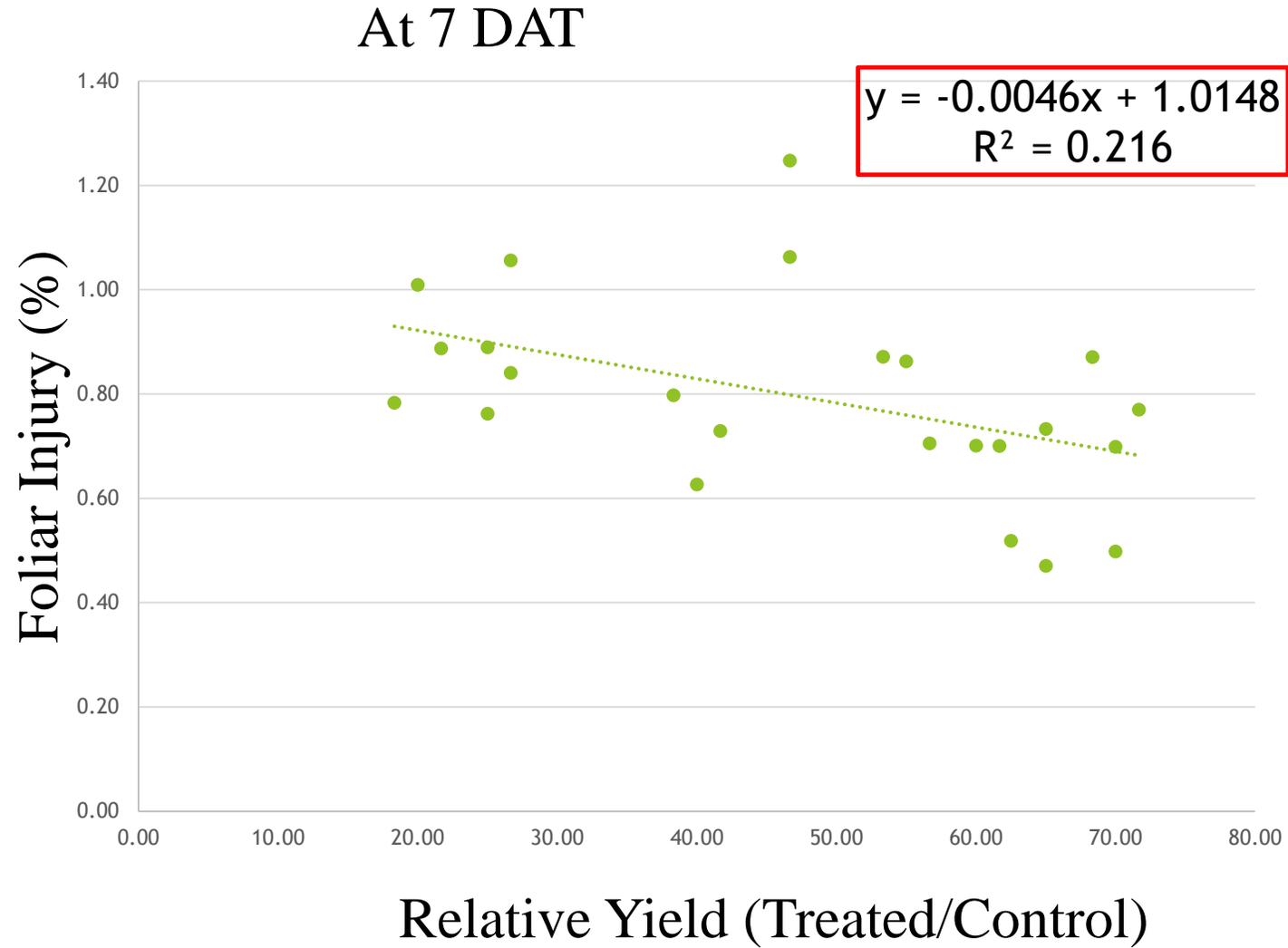


Fig 1: Correlation between foliar damage and relative yield at 7 DAT

Results (2017)

At 14 DAT

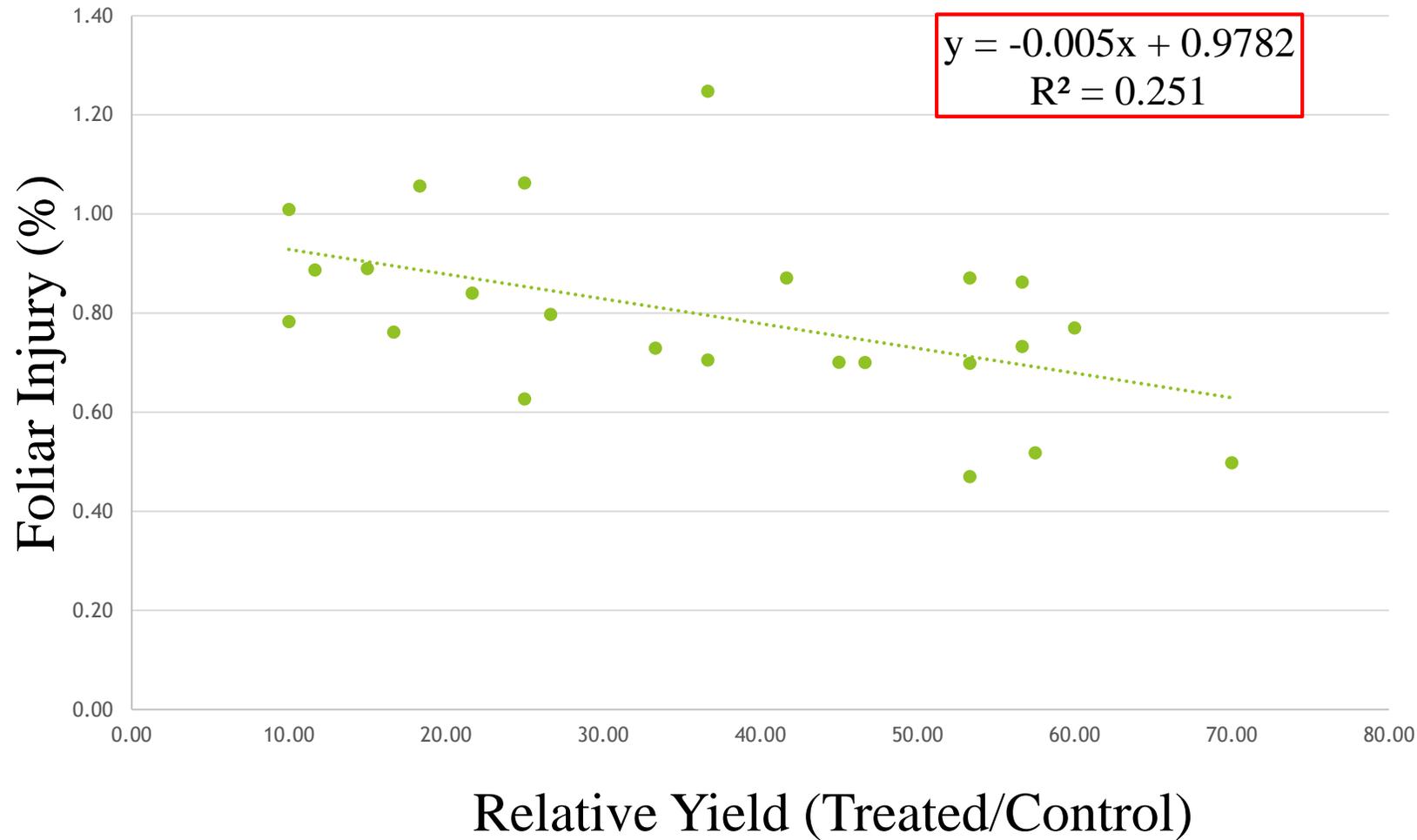


Fig 1: Correlation between foliar damage and relative yield at 14 DAT

Results (2017)

At 21 DAT

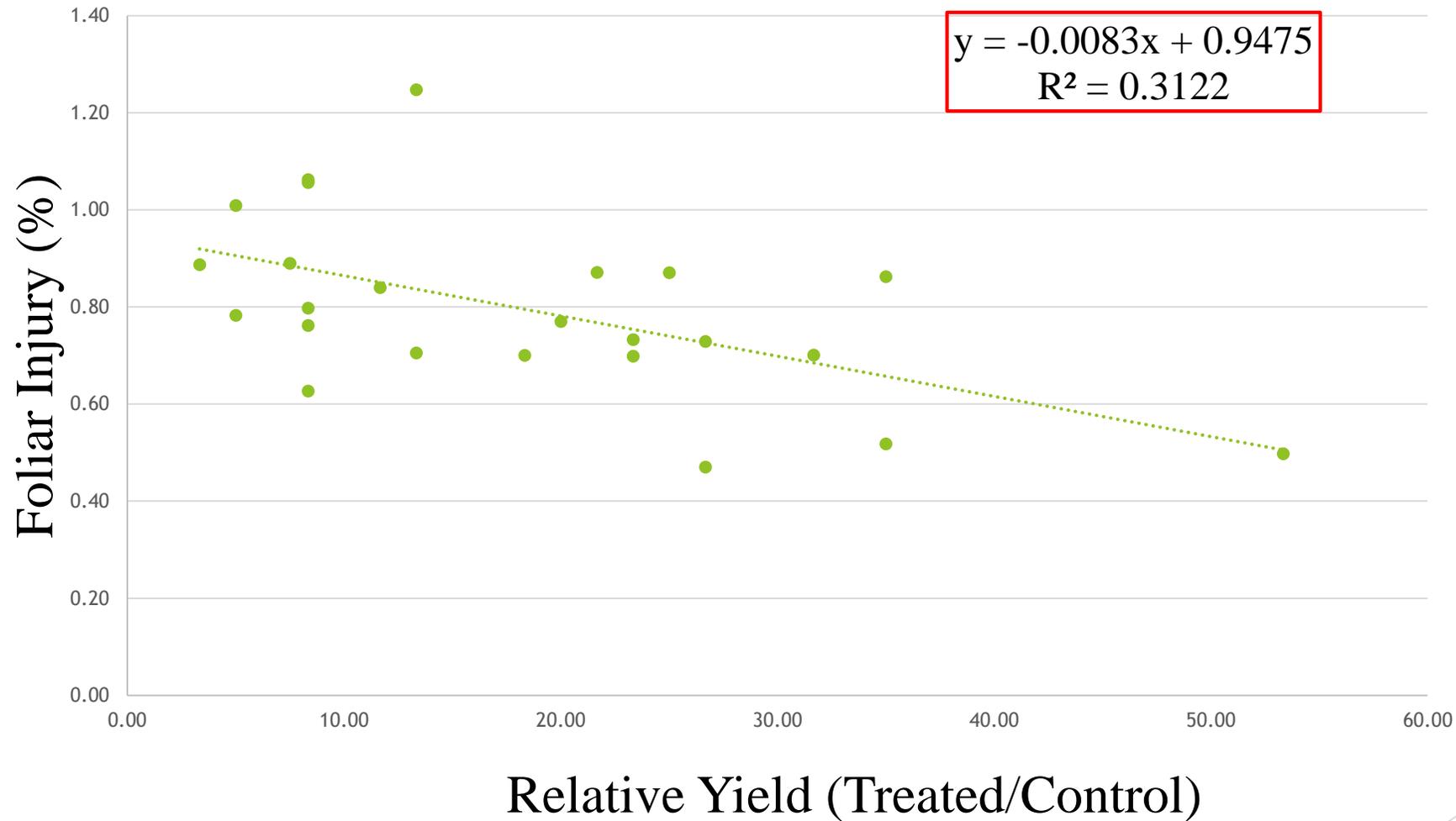


Fig 1: Correlation between foliar damage and relative yield at 21 DAT

Results (2017)

At 7 DAT

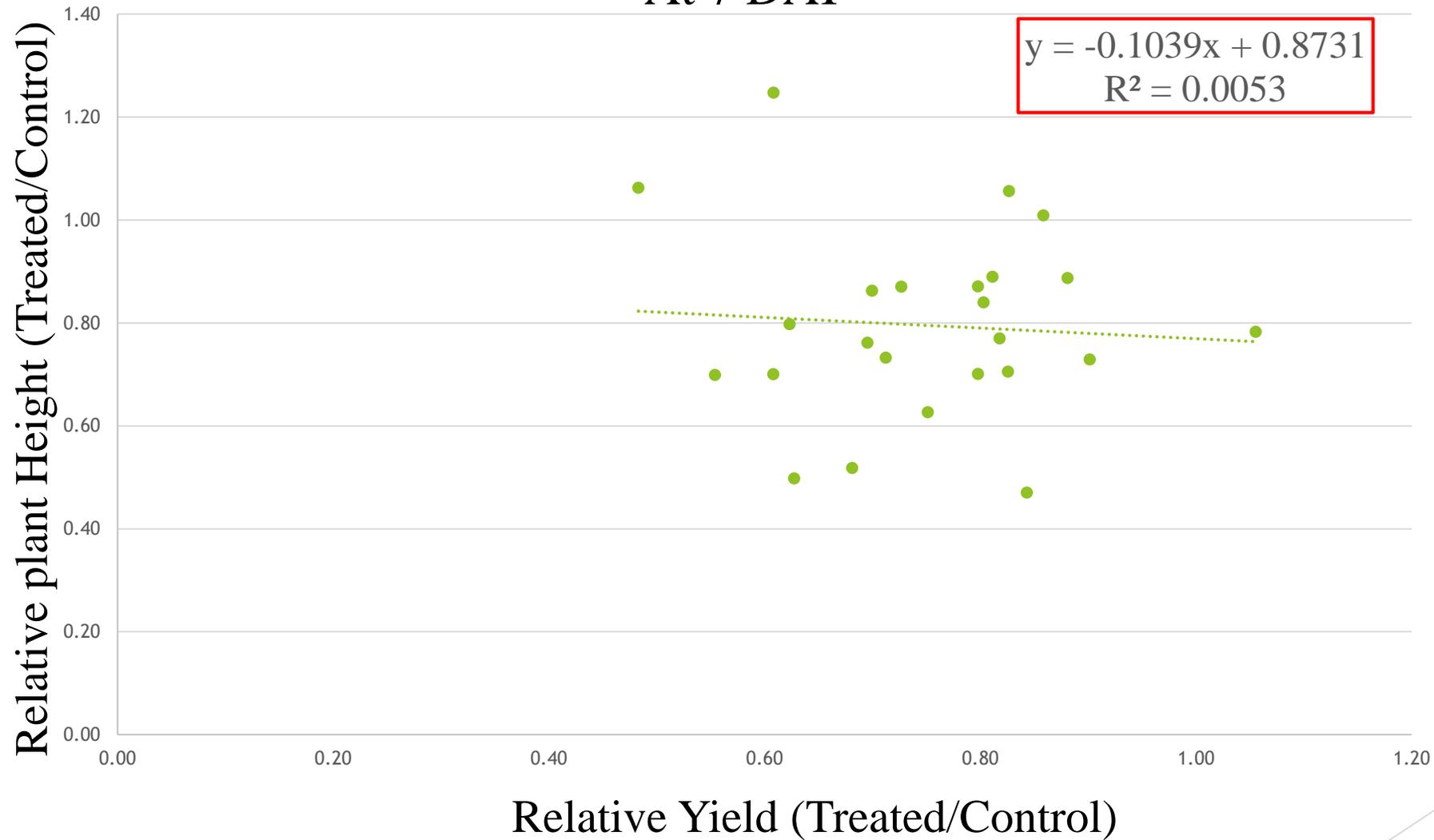


Fig 1: Correlation between relative plant height and relative yield at 07 DAT

Results (2017)

At 14 DAT

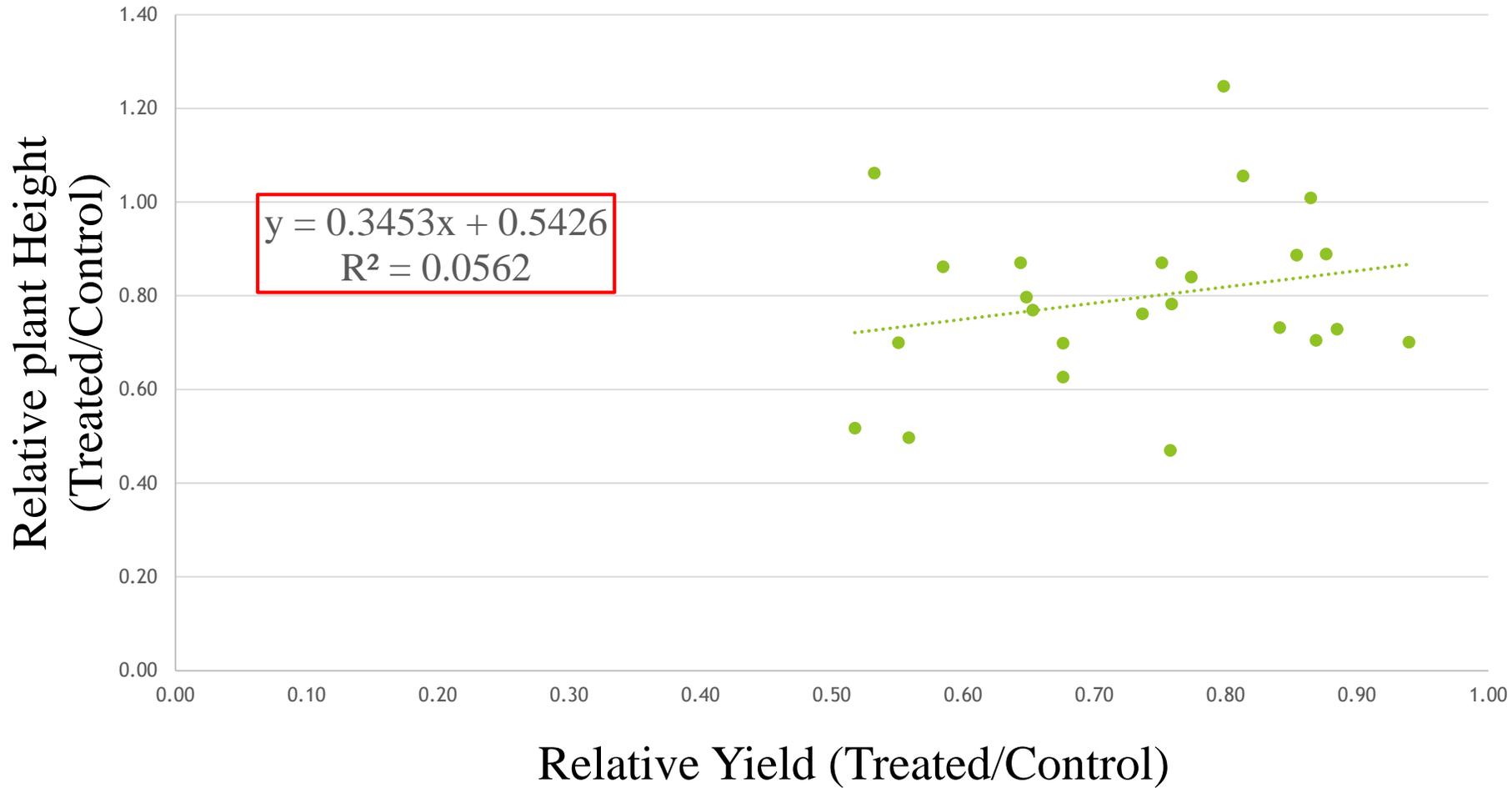


Fig 1: Correlation between relative plant height and relative yield at 14 DAT

Results (2017)

At 21 DAT

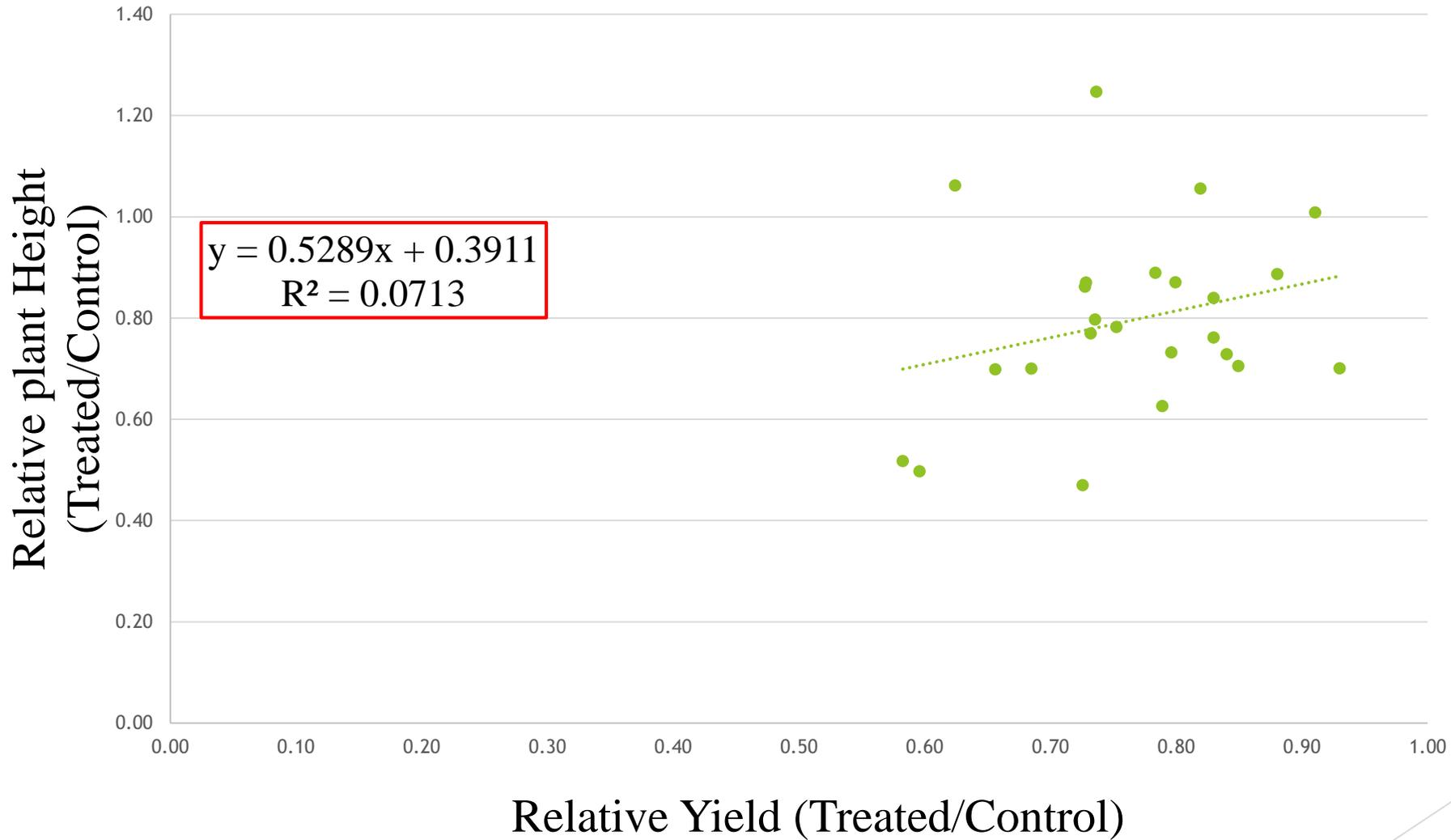


Fig 1: Correlation between relative plant height and relative yield at 21 DAT

Results (2017)

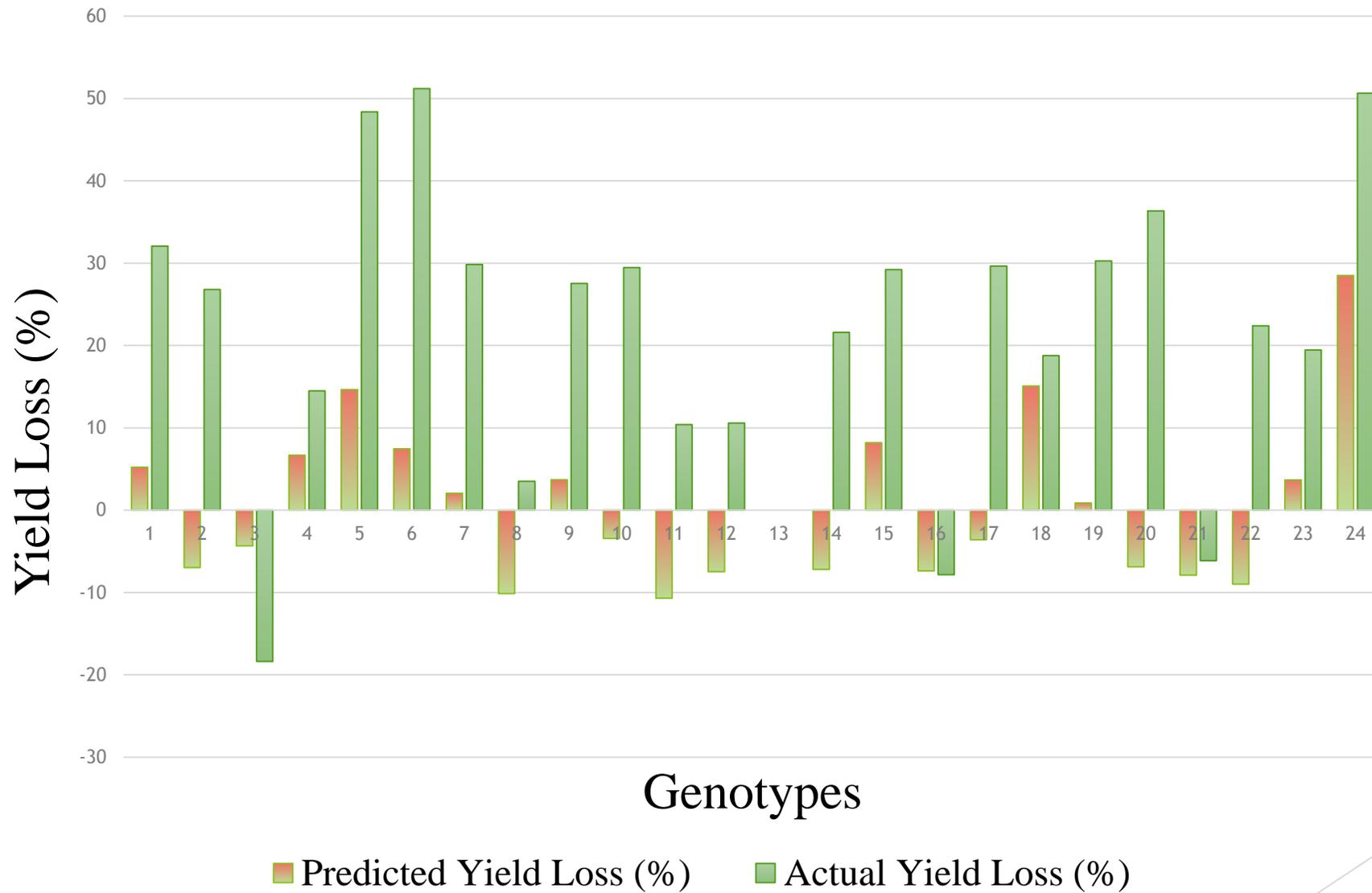


Fig 3: Actual yield loss vs Predicted yield loss

Summary

- Cultivars vary in sensitivity
- Genotypes showed different sensitivity in different years.
 - Environmental Effect
- Based on predicted and actual yield losses, the ID model may not be appropriate for ND environmental conditions
- Improvements to the model are warranted based upon 2016 and 2017 results

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Thank you

