GOCE DELCEV UNIVERSITY – STIP, FACULTY OF AGRICULTURE
DEPARTMENT FOR PLANT AND ENVIRONMENTAL PROTECTION, REPUBLIC OF NORTH MACEDONIA

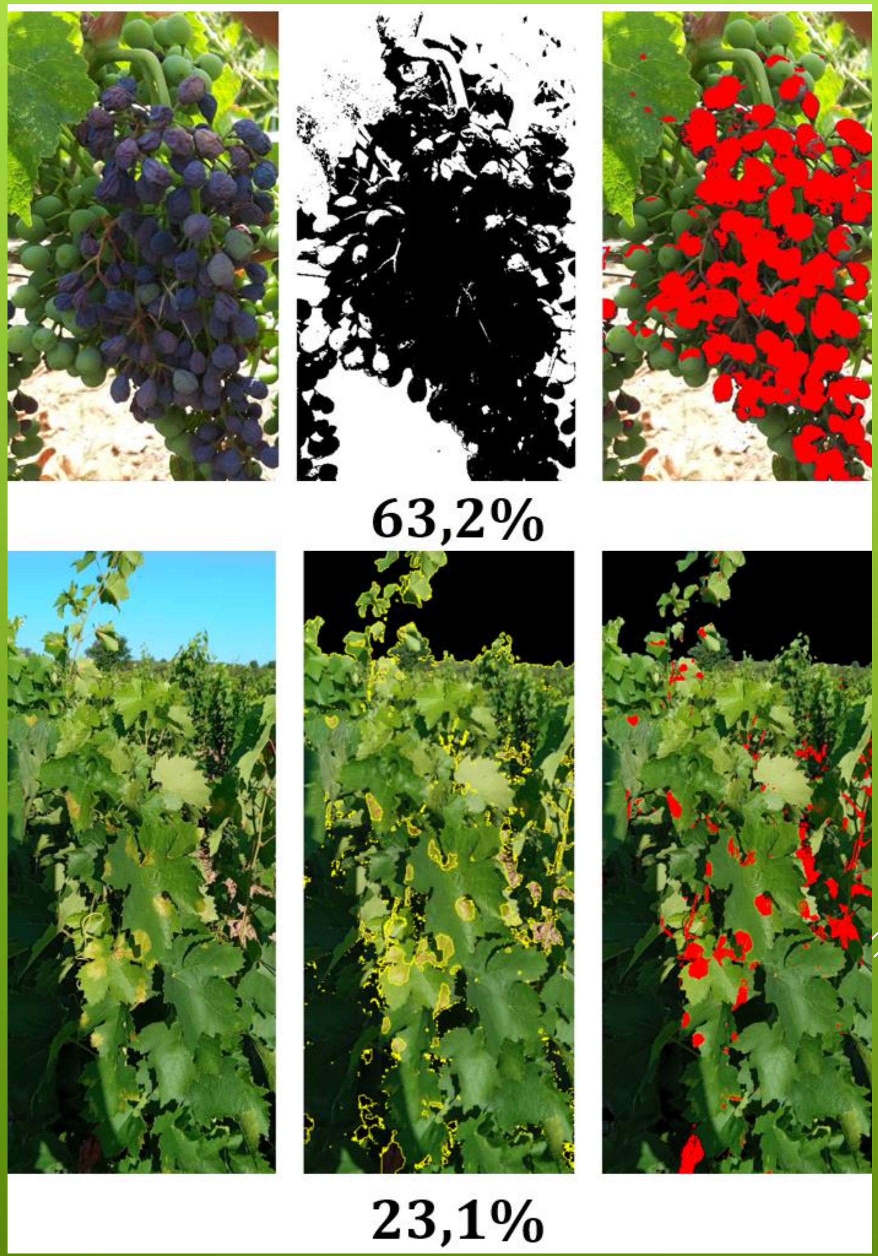
IMPACT OF DISEASE SEVERITY ON INFECTED BUNCHES UPON A YIELD OF GRAPE VARIETY VRANEC, CAUSED BY *PLASMOPARA VITICOLA* (BERK. & M.A. CURTIS) BERL. & DE TONI.

Bojkov Gligor*, Arsov Emilija, Mitrev Sasa

3rd INTERNATIONAL MEETING
AGRISCIENCE & PRACTICE (ASP 2023)

INTRODUCTION

In 2022, a forecasting model of yield loss caused by *Plasmopara viticola* was applied to the black grape variety Vranec to predict yield loss before executing grape harvesting, with the adoption of "Image J" software.



MATERIAL AND METHODS

The research aimed to determine grape yield loss upon infection development of *P.viticola* on bunches and consequently to create a yield loss forecasting model.

The research was conducted, in a vineyard located at Smilica, near Kavadarci, Republic of North Macedonia. A double Guyot pruning method in the vineyard was applied.

Two different plots were compared: A-Control canopy, where the bunches were sprayed only once with a contact fungicide Folpet to prevent yield losses, and B-Standard fungicides treatment, which followed the usual spray schedule during the growing season.

In the A variant (control canopies), 167 bunches were scanned, with the 'image J' software platform. Although, in the B variant (standard fungicides treatment), the results obtained from bunches were not statistically significant because there was no significant level of the disease.

MATERIAL AND METHODS

VARIANTS AND CALCULATIONS

Model description:

1) Quantitative measurements

$DI = \sum x / N$

DI-Disease Incidence

x- Number of diseased bunches

N- Total number of units assessed

Disease Severity- Use on software assessment platform "Image J" of diseased leaves and bunches.

Measurement of temperature during precipitation days

$Tm = (Tda - Tmin) / (Tmax - Tmin)$

Tm-temperature coefficient

Tmin-minimum temperature;

Tmax-maximum temperature;

Tda-daily average temperature

Measurement of rainfall (mm/m2)

2) Statistical Analysis

RESULTS AND DISCUSSION

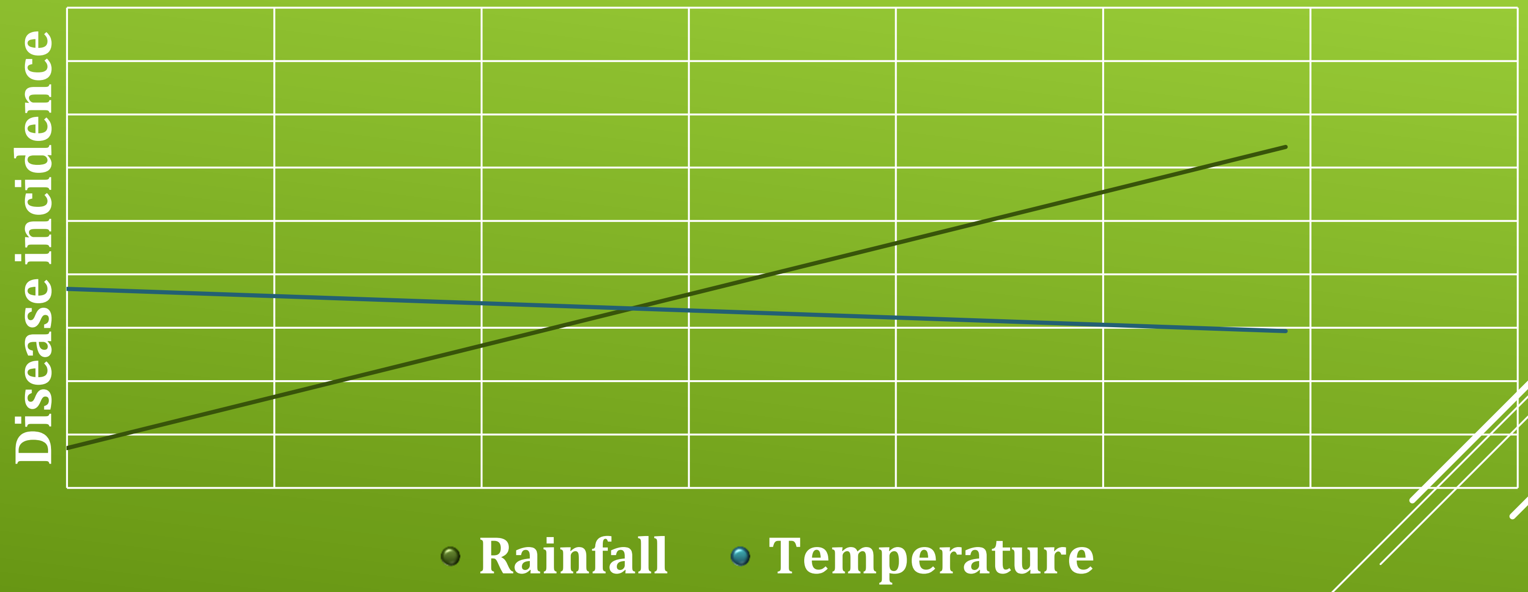
Regression Model Determining Disease Incidence on Bunches

Regression Statistics	
Multiple R	0,717225
R Square	0,514411
Adjusted R Square	0,460457
Standard Error	0,212211
Observations	21

ANOVA	
F	Significance F
9,5342	0,0015

	Coefficients	P-value
Intercept	1,250373	0,004131
Rainfall	0,361155	0,003129
Temperature	-1,24537	0,03648

Infulence of Temperature and Precipitation Upon Disease Incidence on Bunches



$$\gamma = \beta 0 + \beta 1 x_1 + \beta 2 x_2 = 82\%$$

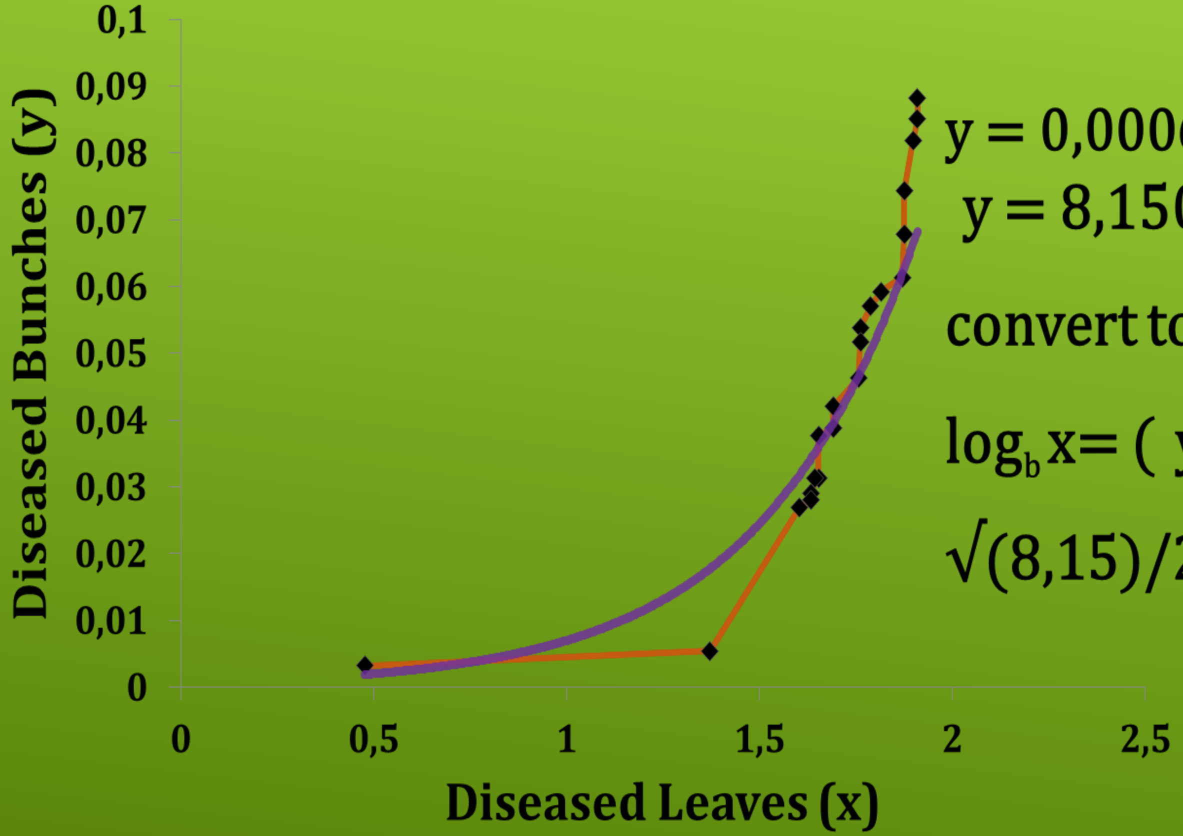
$$\gamma \pm t \times \frac{SE}{\sqrt{n}} \text{ (Confidence interval)}$$

$$\gamma = 72 \text{ to } 92\%$$

RESULTS AND DISCUSSION

Yield Loss Forecast Model Caused by *Plasmopara viticola* –Model 1

Disease Severity Progress in Control Canopies



$y = 0,0006e^{2,5087x}$

$y = 8,15007$

convert to log form (inverse function)

$\log_b x = (y) 34,9\%$ or

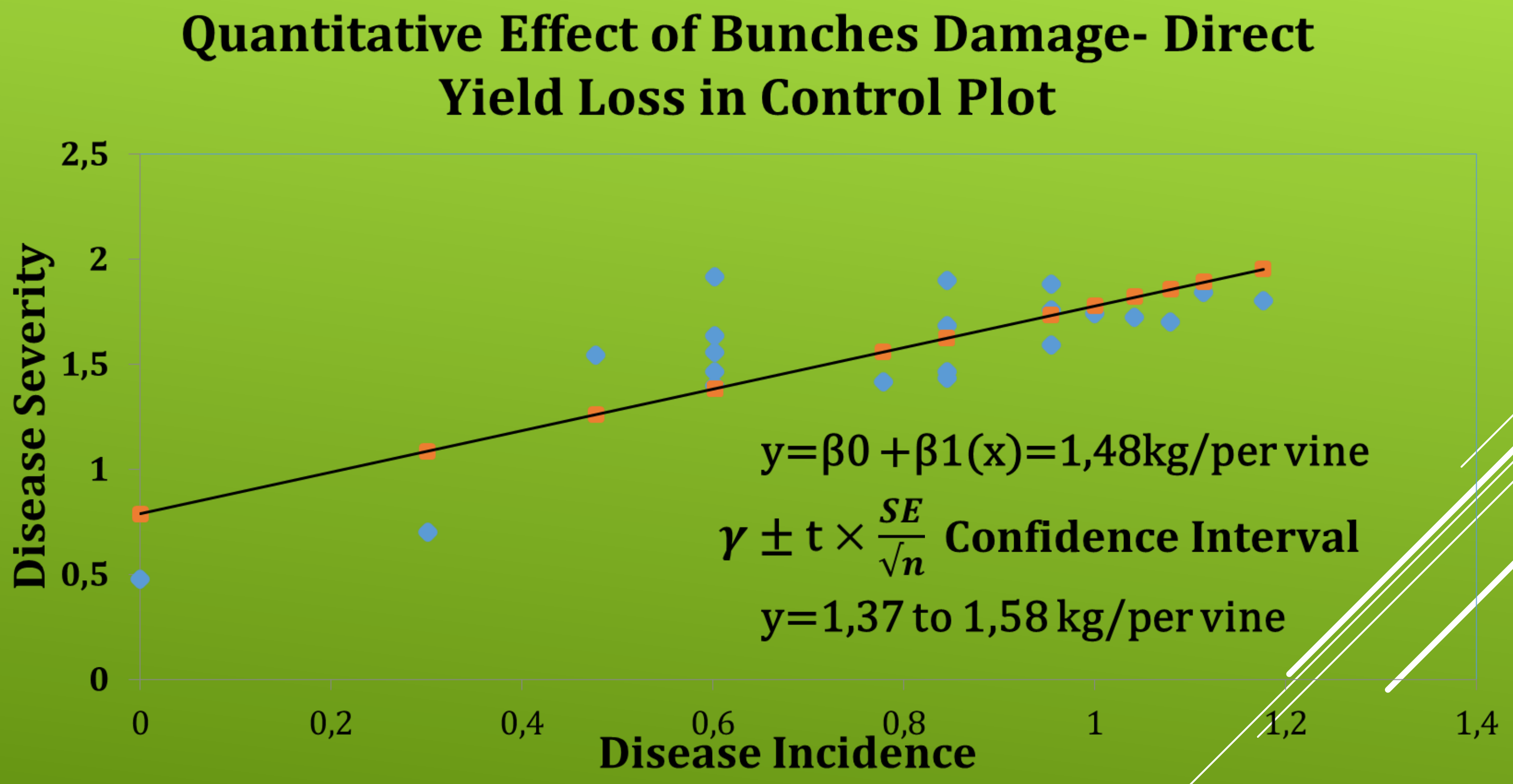
$\sqrt{(8,15)}/2 = 1,427$ kg /per vine

RESULTS AND DISCUSSION

Yield Loss Forecast Model Caused by *Plasmopara viticola*-Model 2

Regression Statistics	
Multiple R	0,792422
R Square	0,627932
Adjusted R Square	0,60835
Standard Error	0,226135
Observations	21
ANOVA	
F	Significance F
32,06596	0,000018503

	Coefficients	P-value
Intercept	0,786914	0,00002
Disease Incidence	0,991104	0,000018503



CONCLUSIONS

Table 1. Overview of prediction model results compared to the actual situation on the field

Yield Loss Forecast Model				Actual situation on the field			
Control canopies (theoretical assumptions)	Results in kg/per vine	%	% predicted yield loss	Control canopies Results in kg/per vine	%	% yield loss	Standard fungicides treatment Results in kg/per vine
Model 1	1,43	33,3	66,7	1,6	37,2	62,7	4,3
Model 2	1,37 to 1,58	31,8 to 36,7	63,2-68,1				

Recomendence

If the average daily temperature ranges from 16.3 to 28.6 C, and the precipitation is equal to or higher than 8 L/m2 in that case, the beginning of infection of the bunches by expected.

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THANKS FOR YOUR ATTENTION

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