RESISTANCE OF FIFTY CORN INBRED LINES TO FOLIAR DISEASES IN TWO SOWING DATES

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INTRODUCTION

Large losses in grain yield in corn are associated with the incidence of diseases. Due to the characteristics of corn growing in Brazil, such as plant height, length of the planting season and economic yield, the most viable measure to control the disease is use of genetic resistance. Reports in the literature indicate that there is genetic variability in cultivars in disease resistance, however few papers discuss in genetic resistance to diseases in corn inbreds.

OBJECTIVES

Identify possible inbred lines resistant to tropical rust (*Physopella zeae* (Mains) Cummins & Ramachar), southern rust (*Puccinia polysora* Underw), gray leaf spot (*Cercospora zeae-maydis* Tehon & E.Y.Daniels), northern leaf blight (*Exserohilum turcicum* (Pass.) Leonard & Suggs), physoderma brown spot (*Physoderma maydis)* and phaeosphaeria leaf spot (*Phaeosphaeria maydis* in association with *Pantoeae ananas*).

MATERIALS AND METHODS

Fifty inbred lines were used, being 18 derived from the Isanão-VF1 population, 9 from Isanão-VD1 population, 10 from Flintisa population, 8 from Dentado population and five from EMPASC 151-*Condá*. Flintisa and Dentado populations were obtained from the corn breeding program of São Paulo State University – UNESP – Ilha Solteira – SP (Brazil) and EMPASC 151- *Condá* is an old OP variety of the Santa Catarina State (Brazil).

The experiments were conducted at the Farm of Teaching, Research and Extension of UNESP - Ilha Solteira, located in Selvíria – MS, Brazil (20° 20'S, 51° 23' and the altitude of 335 m). Evaluations were carried out at 45, 60, 75 and 90 days after planting, determining the severity of disease based on the percentage of symptoms of the plot. The ratings were assigned 1, 2, 3, 4, 5, 6, 7, 8 and 9, corresponding to 0, 1, 10, 20, 30, 40, 60, 80 and >80% of leaf symptoms, respectively.

The Area Under the Disease Progress Curve (AUDPC) for each disease was calculated using the formula proposed by Campbell and Madden (1990):

$$AUDPC = \sum_{i=1}^{n-1}(Y_{i+1} + Y_i)(T_{i+1} - T_i)$$ where:

Y_i: severity of the disease at the stage of evaluation i (i = 1,...n).

Y_{i+1}: severity of the disease at the stage of evaluation i+1.

T_i: evaluation stage i, the number of days after planting.

T_{i+1}: evaluation stage i+1.

n: total number of evaluations.

RESULTS

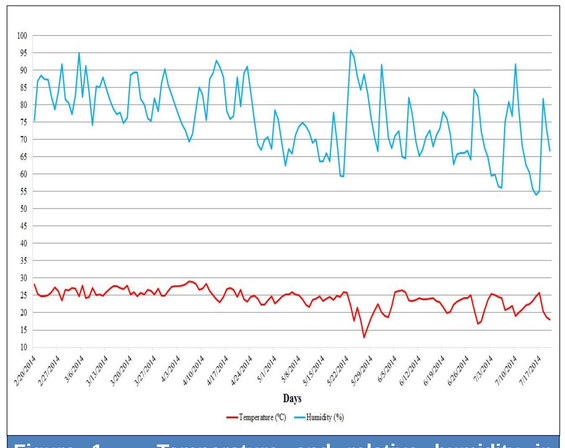

Figure 1 - Temperature and relative humidity in Selvíria–MS, Brazil, from February to July 2014.

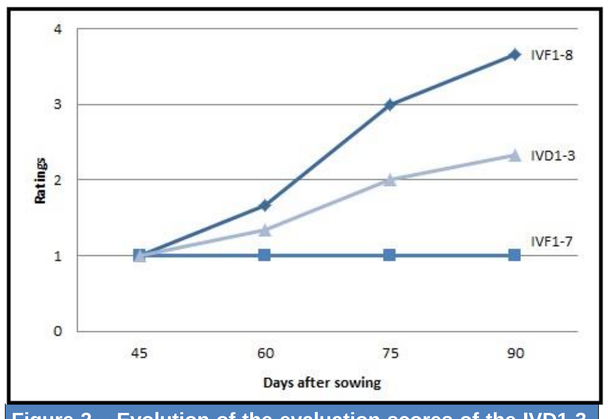

Figure 2 – Evolution of the evaluation scores of the IVD1-3, IVF1-7 and IVF1-8 inbred lines for gray leaf spot in the first season, Selvíria-MS, Brazil, 2014.

Table 1 – Joint analysis (mean squares) for Area Under the Disease Progress Curve for tropical rust (TR), southern rust (SR), gray leaf spot (GLS), northern leaf blight (NLB), physoderma brown spot (PBS) and phaeosphaeria leaf spot (PLS). Selvíria–MS, Brazil, 2014.

Source of variation	DF	TR	SR	GLS	NLB	PBS	PLS
Inbred lines (L)	49	0.4665**	1.8852**	1.0177**	0.3414	0.0590	0.3511**
Seasons (S)	1	0.1611	22.2522*	0.3628	0.0758	8.2220**	2.0415*
Lx S	49	0.5005*	1.7671**	0.7771	0.2426	0.0545	0.2598
Error	196	0.2450	0.7678	0.5911	0.2618	0.0800	0.1999
Average		103.0	134.4	108.1	95.3	93.5	94.4
CV%		4.87	7.58	7.4	5.24	2.92	4.6

***. * Significant to 1% and 5% probability level for the F test*

Table 2 - Individual analysis of variance for Area Under the Disease Progress Curve in both planting dates (season 1: 02.20.2014 and season 2: 04.17.2014) to tropical rust, southern rust, gray leaf spot, northern leaf blight, physoderma brown spot and phaeosphaeria leaf spot, Selvíria – MS, Brazil, 2014.

Source of variation	DF	Season 1	Season 2
Tropical rust			
Blocks	2	1.1953	1.0820
Inbred lines	49	0.7426**	0.2243
Error	98	0.2610	0.2290
Average	-	102.65	103.4
CV%	-	5.04	4.70
Southern rust			
Blocks	2	5.3528	0.1828
Inbred lines	49	2.2758**	1.3764*
Error	98	0.6445	0.8912
Average	-	140.85	128.05
CV%	-	6.78	8.36
Gray leaf spot			
Blocks	2	0.7130	0.0427
Inbred lines	49	1.2002*	0.5946
Error	98	0.7427	0.4396
Average	-	109.05	107.2
CV%	-	8.27	6.40

Source of variation	DF	Season 1	Season 2
Northern leaf blight			
Blocks	2	1.5406	0.9401
Inbred lines	49	0.4039	0.1801
Error	98	0.3689	0.1547
Average	-	95.05	95.45
CV%	-	6.22	4.01
Physoderma brown spot			
Blocks	2	0.0234	0.2258
Inbred lines	49	0.0119	0.1015
Error	98	0.0119	0.0893
Average	-	90.25	96.75
CV%	-	1.14	3.03
Phaeosphaeria leaf spot			
Blocks	2	0.1257	0.2984
Inbred lines	49	0.2053	0.4056*
Error	98	0.1445	0.2552
Average	-	92.7	96.06
CV%	-	3.94	5.15

***. * Significant to 1% and 5% probability level for the F test*

CONCLUSIONS

Based on these seasons, when there was discrimination between inbred lines for the incidence of diseases, the inbred lines with improved levels of resistance to tropical rust, southern rust and gray leaf spot were IVF1-3, IVF1-9, IVF1-10, IVF1-11, IVF1-25, IVF1-230, IVD1-2-1, IVD1-12, 2F, 3F, 6F and 4C. For phaeosphaeria leaf spot, 38 inbred lines have satisfactory resistance. For northern leaf blight and physoderma brown spot, trials in other seasons (or artificial inocula) are required for efficient selection.

REFERENCES

Campbell CL and Madden LV (1990) . **Introduction to plant disease epidemiology**. Wiley-Interscience, New York, 532p.

ACKNOWLEDGMENTS

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CAPES