P_2.07: Evaluation of Maize hybrids and inbreds against Southern corn rust

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Introduction

Southern corn rust cause by the fungus *Puccinia polysora* Underw. Is a destructive disease in maize, caused yield loss of up to 39-45% on susceptible maize hybrid (Rodriguez-Ardon et al. 1980). In Thailand, lower temperature and high moisture condition in the rate rainy season are favorable for development of an epidemic in maize plantation area (Auwanich and Anchareesangas, 1998). Host resistance can reduce the growth and reproduction of the pathogen, resulting in less severe symptoms of disease. The evaluation of maize germplasm for response to southern corn rust is to identification of disease-resistant germplasm. Incorporation of resistance in hybrids can increase yields, lower production costs and reduce the use of fungicide.

Methods

Field evaluation for southern corn rust resistance under natural infection was performed during the rainy season of 2006-2011 at National corn and sorghum research center, Pakchong Nakhon Ratchasima and Nakhon Sawan Field crop research center, Tak Fa Nakhon Sawan. Fourteen inbreds and fifty nine hybrids obtained from the maize breeding program were evaluated. The material was grown in four rows 5-m plots with 0.75 cm between row and 0.20 cm between plants. Fertilizers were applied two times, 312.5 kg/ha of 16-20-0 as basal at the time of planting and 156.25 kg/ha of 46-0-0 applied three weeks after planting by side dressing. Southern corn rust was score 80 days after planting for relative severity using a scale of 1 – 5, with 1 indicating the lease and 5 indicating the most severe infection. This response can also be described as resistant, moderately resistant, moderately susceptible and susceptible. On this rating scale, primary considerations were for the amount of leaf tissue killed and the extent of pustule coverage the leaf. Intermediate rating between two numbers can also be recorded.

Results

Southern born rust rating on inbreds ranged from 1.0 - 4.2 and average 2.2. Seven lines have score below 2, ranged from 1.0-1.8 Four lines showed intermediate interaction, score ranged from 2.3 – 3.2 and another two lines have severe infection with score ranged from 4.0 - 4.2. In this experiments, Nei 412019 and Nei 452004 were highest Rust rating on hybrid ranged from 1.0 – 3.4 and average 1.9. Among fifty nine hybrids, thirty four varieties have score below 2, ranged from 1.0 – 1.9. Twenty five varieties showed intermediate reaction, score ranged from 2.0 – 3.4. There commercial hybrid, NK 48, Big 919 and CP-DK 888 showed intermediate reaction with the score 3.5, 2.7 and 3.1 respectively. The released hybrids of Nakhon Sawan field crops research center, NS 72 showed intermediate reaction whereas NS 2 and NS 3 were lower infection with score 1.4 and 1.5 respectively.

Conclusions

Base on severity of disease symptom, hybrids can be categorized into three classes, thirty four varieties were resistant, twenty one varieties were moderately resistant and four varieties were moderately susceptible. Inbred can be categorized into four classes, eight lines were resistant, three lines were moderately resistant, one line was moderately susceptible and two lines were susceptible.

References

Auwanich, W. and D. Anchareesangas. 1998. Plant Disease and Microbiology Newsletter. 8(1)11-14.

Rodriguez-Ardon R., et al. 1980. Crop Science. 20:812-814.

Table 1. Southern corn rust score of 79 maize lines/varieties at Nakhon Sawan field crops research center (NSW) and National corn and sorghum research center (2006 -2010)

No.	Line/variety[1]	Year - location	score
1	Nei 412019	2006 NSW	4.0
2	Nei 452004	2006 NSW	4.2
3	Nei 452008	2006 NSW	1.0
4	Nei 452010	2006 NSW	1.8
5	Nei 452017	2006 NSW	1.5
6	Nei 452019	2006 NSW	1.3
7	Nei 452026	2006 NSW	2.8
8	Nei 452029	2006 NSW	3.2
9	Nei 452030	2006 NSW	2.3
10	Nei 452031	2006 NSW	1.5
11	Nei 452006	2006 NSW	2.7
12	Nei 452015	2006 NSW	1.8
13	Nei 452009	2006 NSW	1.7
14	Nei 9202(T)	2006 NSW	1.7
15	NSX 042004	2006 SW	3.4
16	NSX 042004	2006-2007 SW,NSW	3.0
17	NSX 042005	2006 SW,NSW	3.0
18	NSX 042006	2006-2007,2010 SW,NSW	2.3
19	NSX 042007	2006-2007 SW	1.8
20	NSX 042010	2006-2007 SW,NSW	1.8
21	NSX 042011	2006-2007 SW	1.5
22	NSX 042012	2006-2007 SW	2.1
23	NSX 042013	2006-2007,2010 SW,NSW	2.0
24	NSX 042021	2006 SW	2.7
25	NSX 042022	2006-2010 SW,NSW	1.5
26	NSX 042023	2006 SW	2.4
27	NSX 042024	2006-2007 SW	1.8
28	NSX 042025	2006-2007 SW	2.0
29	NSX 042026	2006 SW,NSW	1.6
30	NSX 042027	2006 SW	2.8
31	NSX 042029	2006-208 SW,NSW	1.5
32	NSX 042030	2006 SW,NSW	2.2
33	NSX 042036	2006 SW	2.3
34	NSX 042037	2006 SW	2.6
35	NSX 052011	2007-2010 SW,NSW	1.7
36	NSX 052012	2007-2010 SW,NSW	1.6
37	NSX 052014	2007-2011 SW,NSW	1.5
38	NSX 052015	2007-2010 SW,NSW	2.3
39	NSX 052016	2007-2010 SW,NSW	1.7
40	NSX 052018	2007-2008 SW,NSW	2.5
41	NSX 062006	2007-2010 SW, NSW	1.1
42	NSX 062007	2006 NSW	1.1
43	NSX 062011	2006 NSW	1.0
44	NSX 062012	2007,2009 SW,NSW	1.4
45	NSX 062021	2007 NSW	1.4
46	NSX 062029	2007-2008 SW,NSW	1.3
47	NSX 062030	2007 SW	1.2
48	NSX 062031	2007 SW	1.6
49	NSX 062033	2007 SW	2.1
50	NSX 072005	2007 SW	2.7
51	NSX 072006	2007 SW	2.7
52	NSX 072007	2007 SW	2.5
53	NSX 072009	2008 NSW	1.2
54	NSX 072010	2008 NSW	1.5
55	NSX 072011	2008 NSW	1.7
56	NSX 072013	2008 NSW	3.7
57	NSX 072014	2008 NSW	1.2
58	NSX 072015	2008 NSW	1.9
59	NSX 072016	2008 NSW	1.7
60	NSX 072017	2008 NSW	2.1
61	NSX 072019	2008 NSW	1.6
62	NSX 072020	2008 NSW	1.5
63	NSX 072021	2008 NSW	1.1
64	NSX 072022	2008 NSW	1.2
65	NSX 072023	2008 NSW	1.4
66	NSX 072024	2008 NSW	2.7
67	NSX 072025	2008 NSW	1.1
68	NSX 072026	2008 NSW	1.7
69	NSX 072028	2008 NSW	2.1
70	NSX 072029	2008 NSW	2.9
71	NSX 072030	2008 NSW	2.6
72	NSX 072031	2008 NSW	1.5
73	NSX 072039	2008 NSW	1.2
74	NK 48	2006-2010 SW,NSW	3.5
75	Big 919	2006-2010 SW,NSW	2.7
76	CP-DK 888	2006-2010 SW,NSW	3.1
77	NS 72	2006-2007 SW,NSW	2.7
78	NS 2	2006-2010 SW,NSW	1.4
79	NS 3	2010 NSW	1.5

[1] No. 1-14 are inbreds and No. 15-73, 78-79 are hybrids obtained from Nakhon Sawan field crops center, No. 74-76 are commercial hybrids.