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Resistance to sclerotinia head rot in sunflower hybrids.

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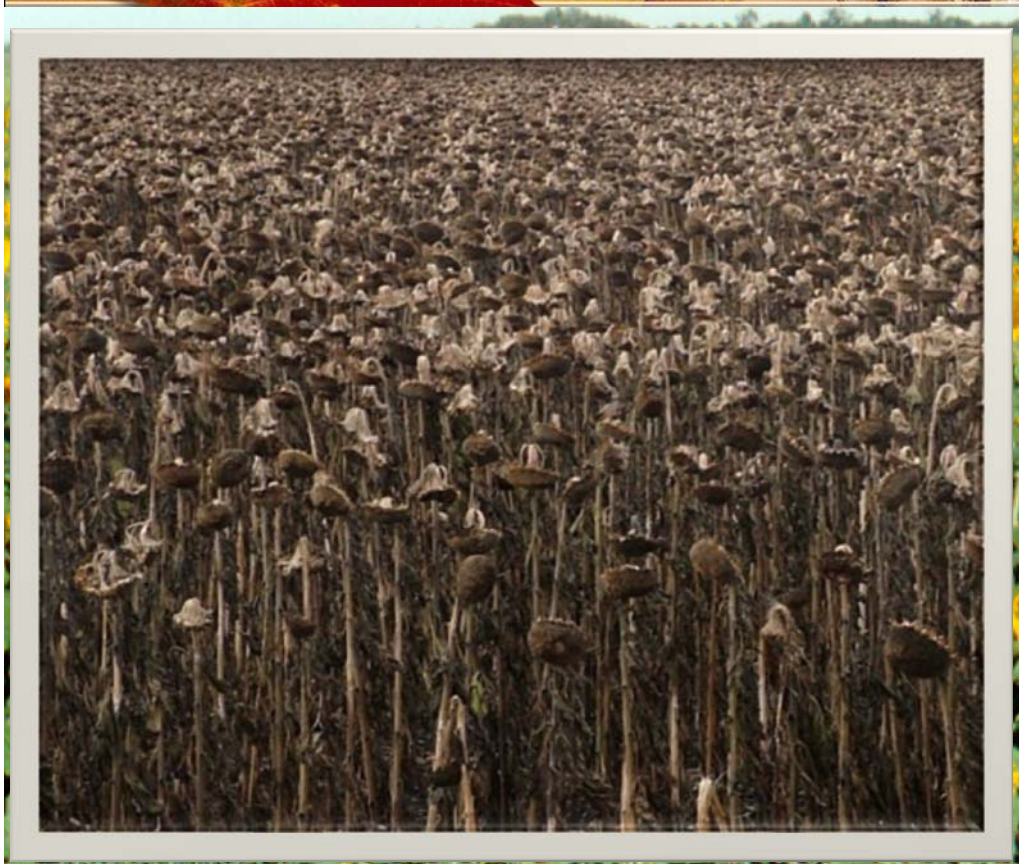


INTRODUCTION

- *Sclerotinia Sclerotiorum* can cause root infections and plant wilt, mid-stem and head rot
- Major disease of sunflower *Helianthus annuus.*
- Incidence and severity vary between years and regions depending on the environmental conditions, sclerotia prevalent in crop and adjacent fields.
- Local epidemics occur and may cause >50% losses in yield and quality of seed.
- Lack or limited resistance in commercial hybrids.

What leads to Sclerotinia head rot epidemics

- Abundant sclerotia in the soil or in adjacent fields.
- Susceptible hybrids , flowering period and after.
- High soil moisture, saturation, 7-10 days, apothecia
- High relative humidity for ascospores to infect.
- Insect/bird damage to the head creates an entry for infection, sugary glands on back of heads
- Epidemics can occur at any time from early flowering to maturity depending on the above conditions.

Incidence and Severity of Sclerotinia Wilt and Head Rot in Manitoba

	% of Fields						Range Incidence / Severity					
Disease	09	08	07	06	05	04	09	08	07	06	05	04.
Wilt	91	68	46	72	47	70	T-20	T-10	T-5	T-10	T-10	T-50
Head Rot	75	41	9	47	24	81	T-40	T-30	T-10	T-5	T-10	T-80

Sunflower diseases in Manitoba 2006-09

	% of Fields				Range % Incidence / Severity			
Disease	09	08	07	06	09	08	07	06
Scl. Wilt	91	68	46	72	T-20	T-10	T-5	T-10
Scl. Head Rot	75	41	9	47	T-40	T-30	T-10	T-5
Verticillium	85	71	50	87	T-20	T-15	T-20	T-20
D. Mildew	50	41	81	42	T-10	T-20	T-10	T-10
Rust	70	74	57	66	T-40	T-40	T-20	T-20
Septoria	7	7	10	57	T-5	T-5	T-5	T-20
P. Mildew	T	T	5	23	T	T-5	T-5	T-5
Pho/Phomopsis	10	10	10	26	T-5	T-5	T-5	T-5

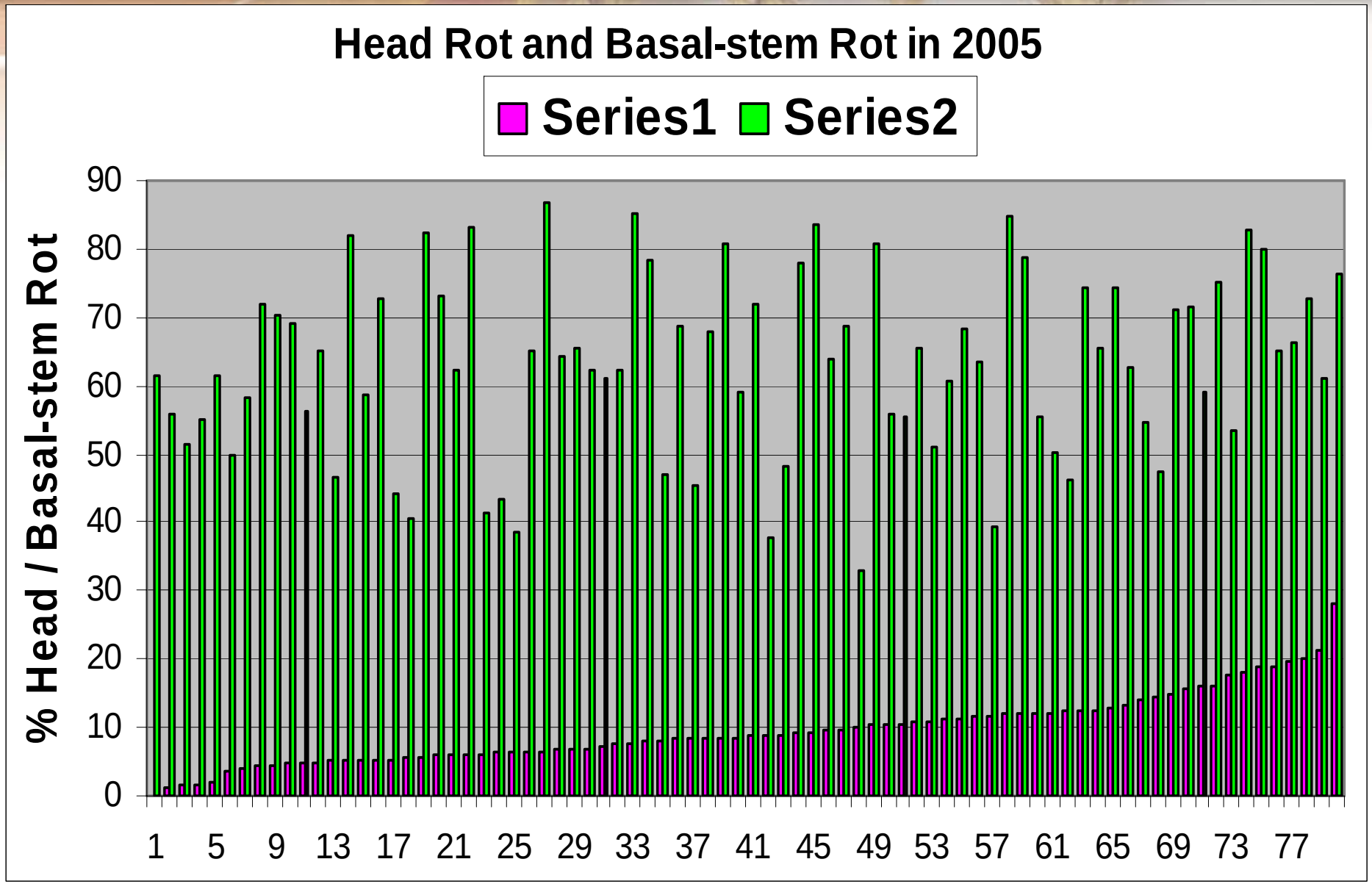
Objectives:

- To evaluate a wide range of sunflower hybrids/ genotypes for their reaction to sclerotinia head rot in field trials in five locations, ND, SD, MN, and MB
- To identify sources of resistance/tolerance to this disease for future incorporation of genetic resistance in commercial sunflower hybrids.

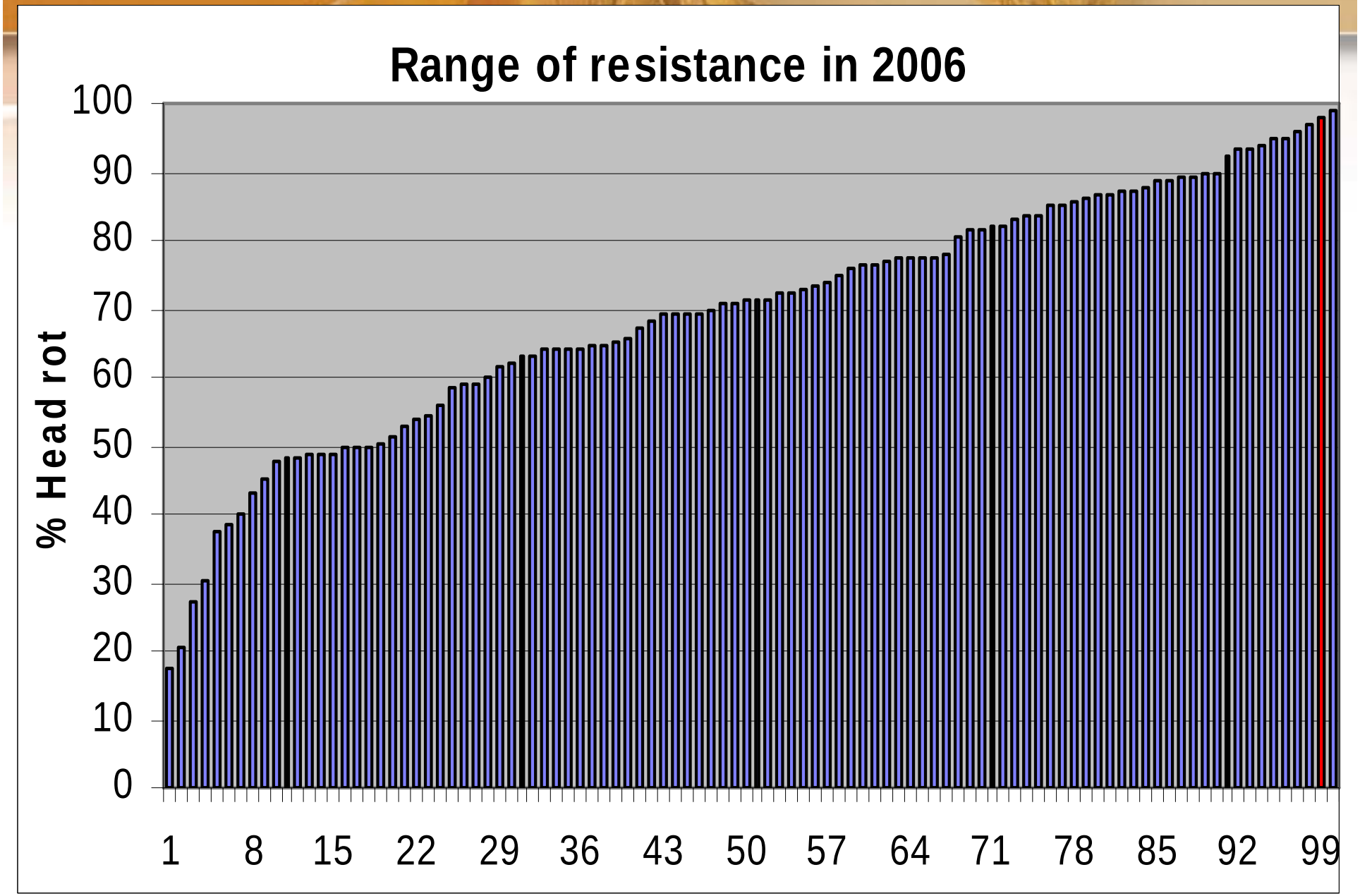
Materials and Methods

- 100 sunflower hybrids, 2005-09, field tests, four replicates
- Two groups of hybrids, early & late flowering, 10-15 heads
- 1st spray at 75 bloom, Cut heads that are not ready.
- Inoculate heads with ascospores suspension (evening), supplement with ground sclerotinia-infected millet seed
- Operate misting system after inoculation 5 mn/30 mn
- 2nd artificial inoculation 2-wk later.
- Assess incidence of Head rot, Mid-stem rot and basal-stem rot (wilt) after each inoculation time and weekly.
- Assess head rot infections on 1-5 scale end of season.

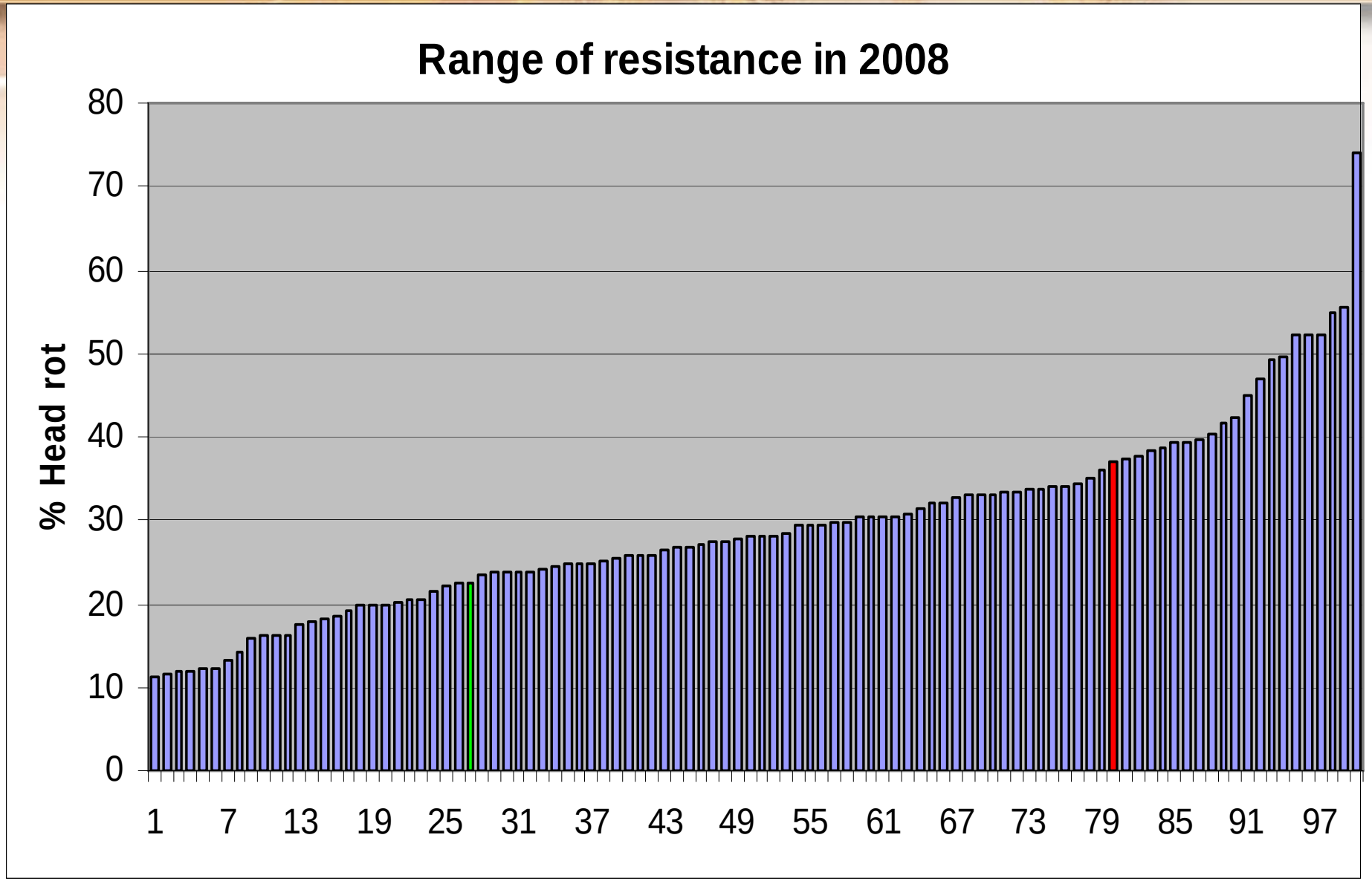
RESULTS

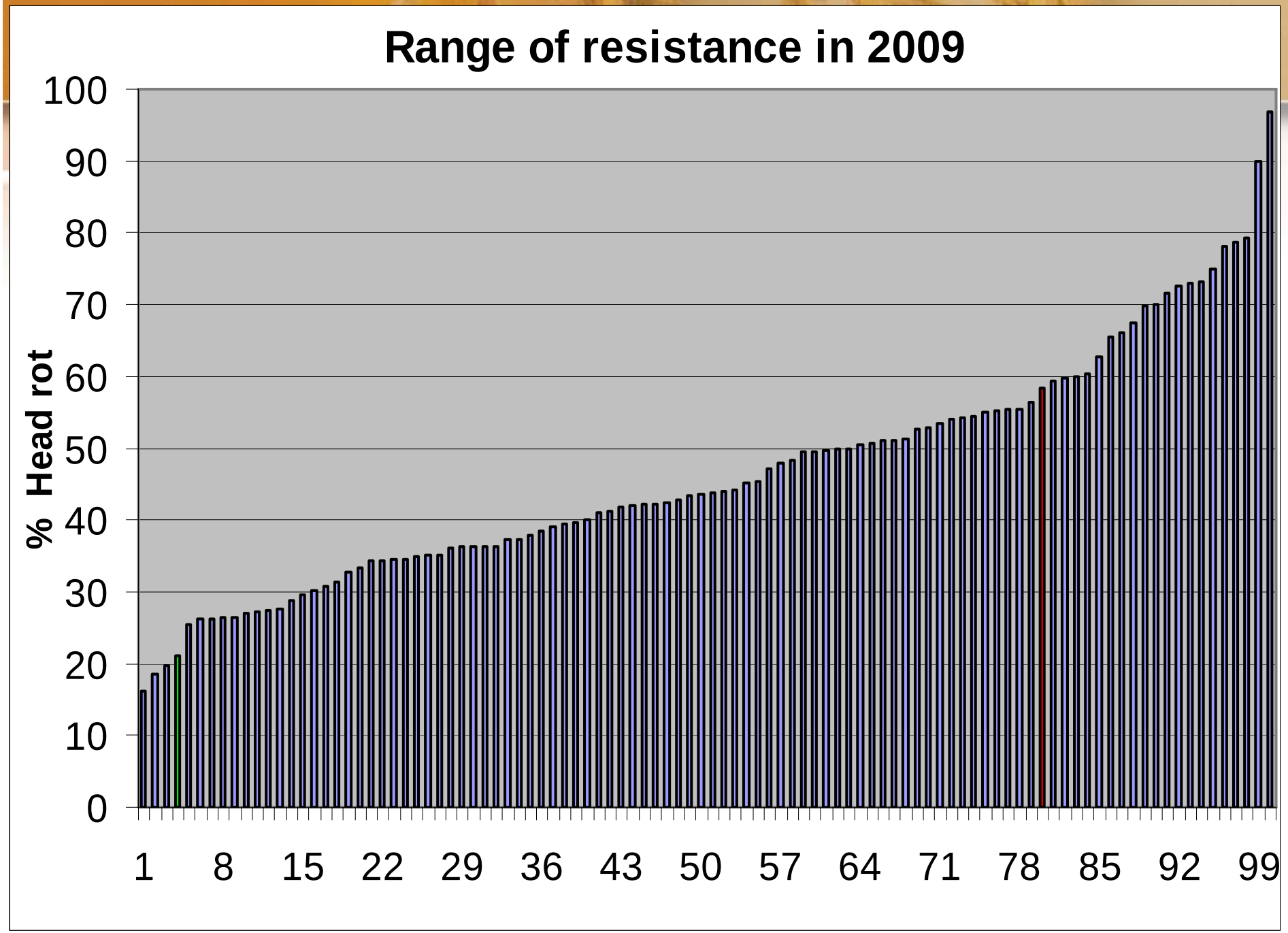

Head Rot and Basal-stem Rot in 2005
Series1
Series2
% Head / Basal-stem Rot
0
10
20
30
40
50
60
70
80
90
1
5
9
13
17
21
25
29
33
37
41
45
49
53
57
61
65
69
73
77

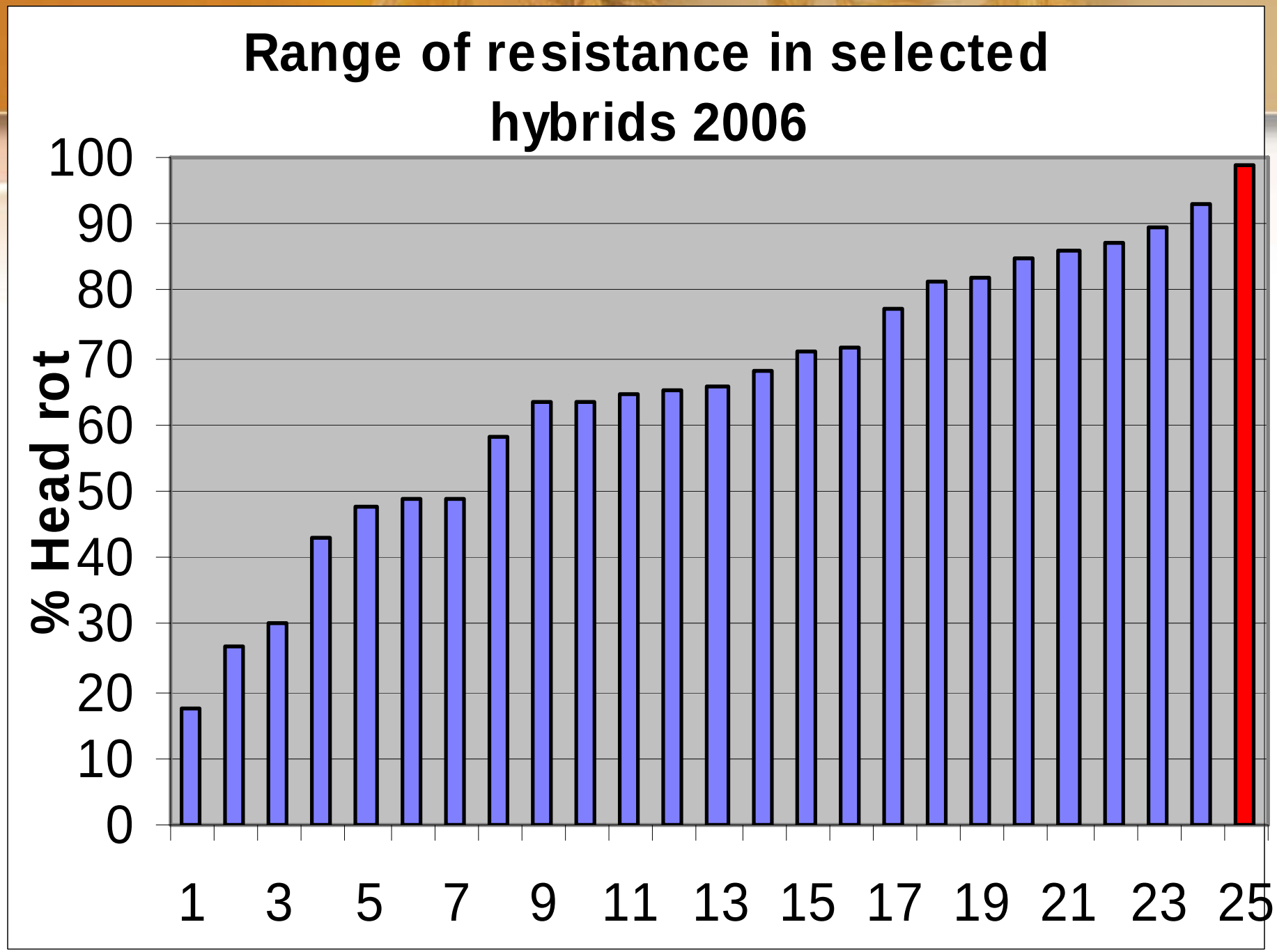
RESULTS

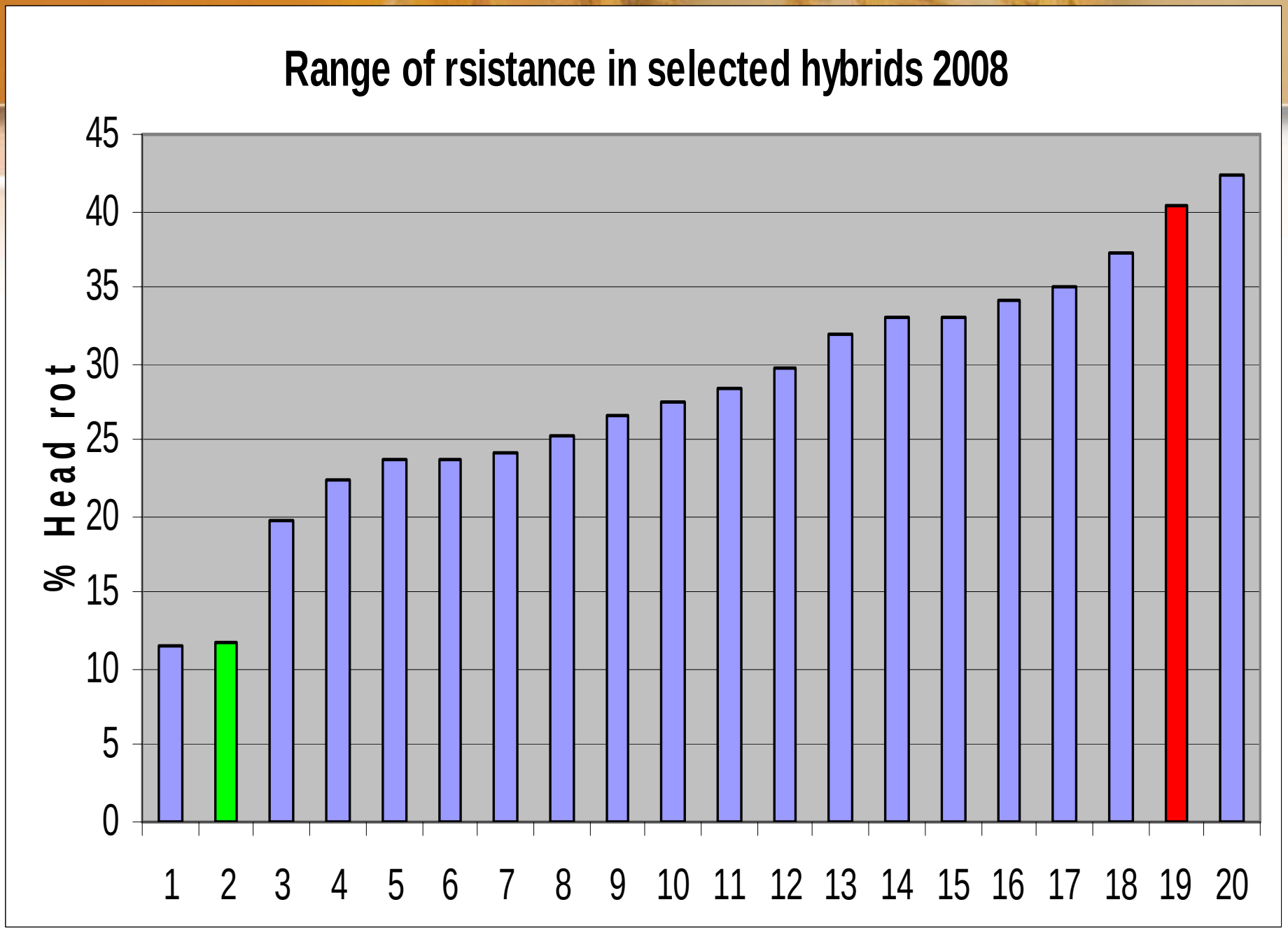

Range of resistance in 2006
% Head rot
100
90
80
70
60
50
40
30
20
10
0
1
8
15
22
29
36
43
50
57
64
71
78
85
92
99

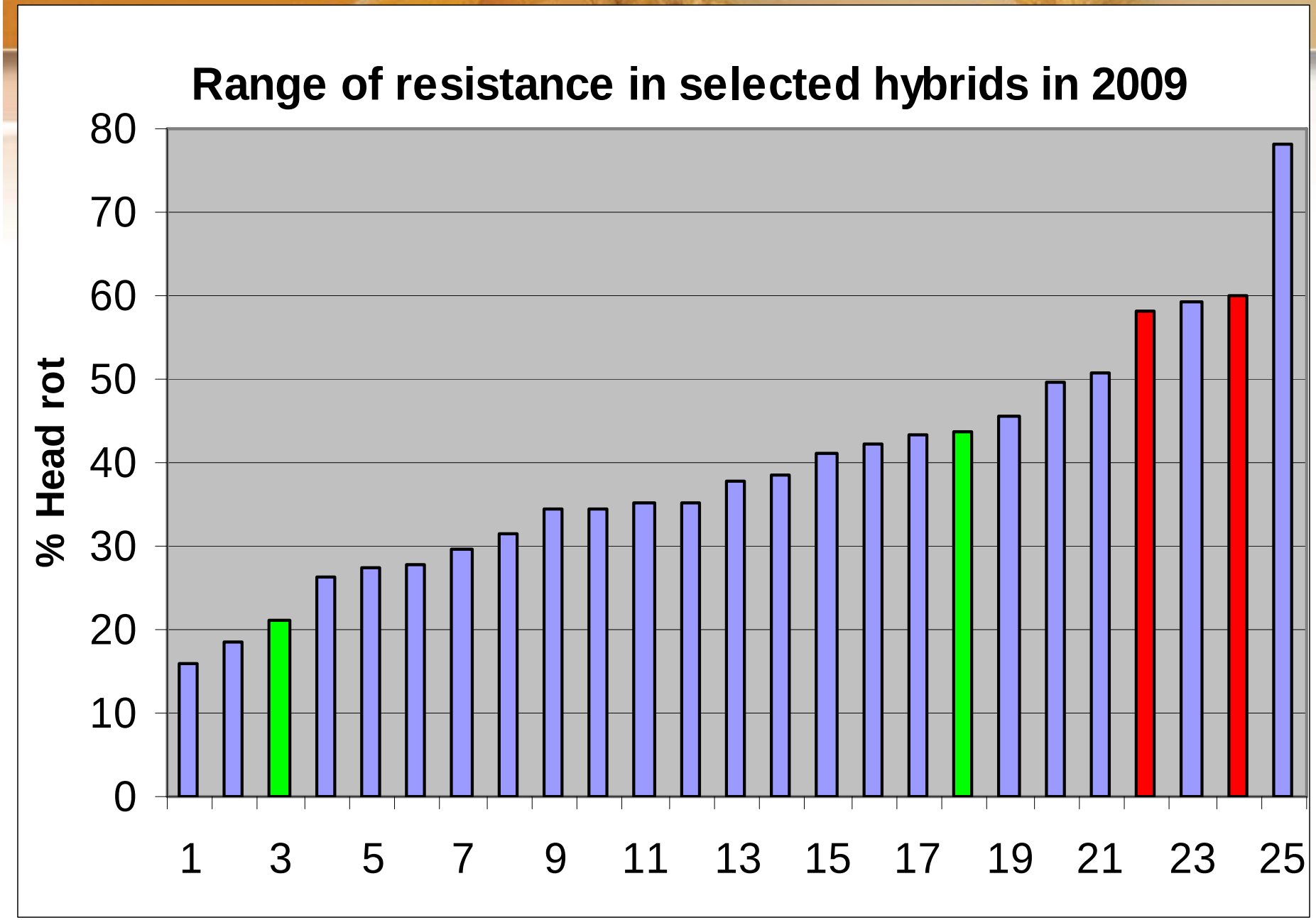
RESULTS

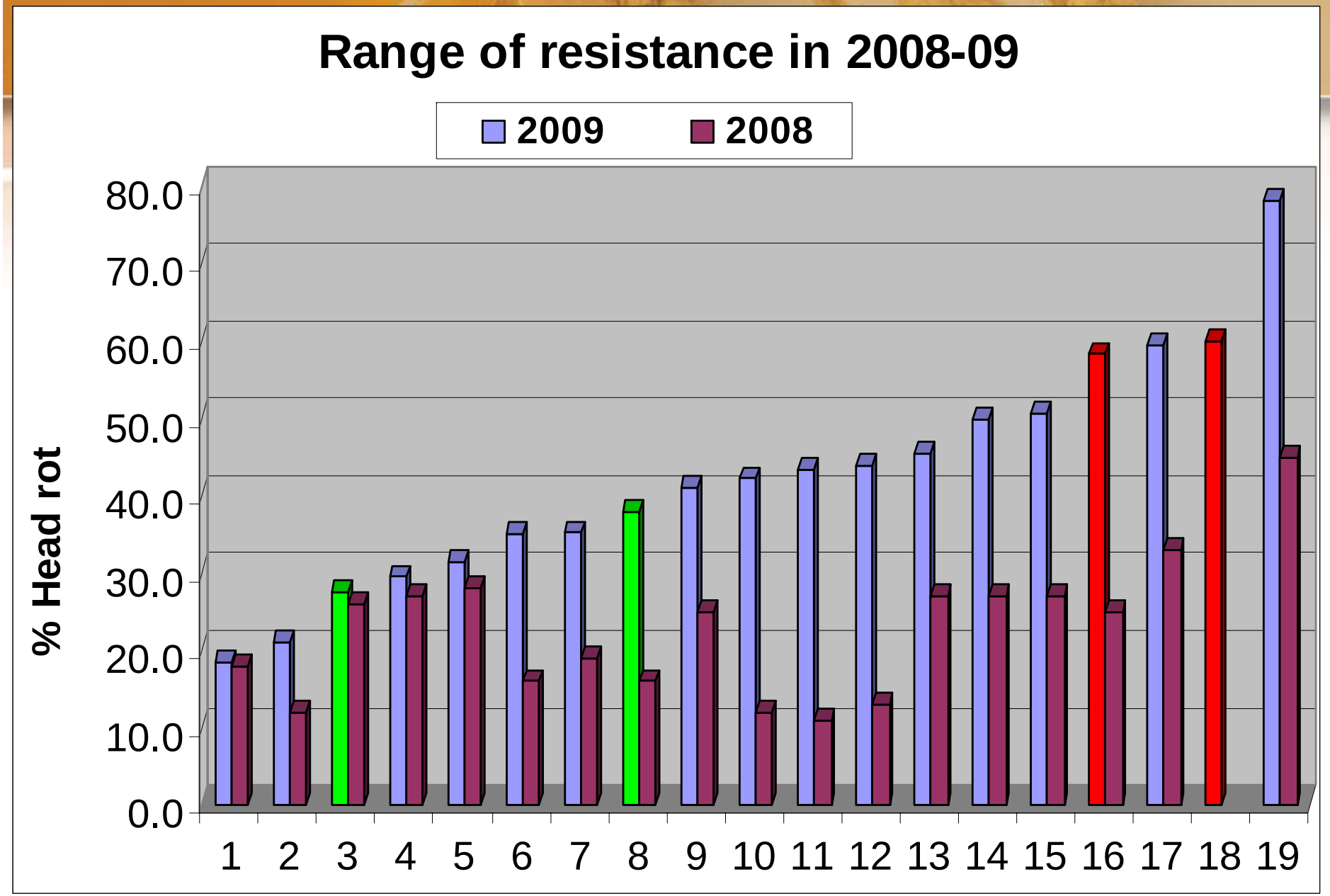

Range of resistance in 2008
% Head rot
80
70
60
50
40
30
20
10
0
1
7
13
19
25
31
37
43
49
55
61
67
73
79
85
91
97


Range of resistance in 2009
% Head rot
100
90
80
70
60
50
40
30
20
10
0
1
8
15
22
29
36
43
50
57
64
71
78
85
92
99


Range of resistance in selected hybrids 2006
% Head rot
100
90
80
70
60
50
40
30
20
10
0
1
3
5
7
9
11
13
15
17
19
21
23
25


Range of rsistance in selected hybrids 2008
% Head rot
45
40
35
30
25
20
15
10
5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20


Range of resistance in selected hybrids in 2009
% Head rot
80
70
60
50
40
30
20
10
0
1
3
5
7
9
11
13
15
17
19
21
23
25


Range of resistance in 2008-09
2009
2008
% Head rot
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19

Conclusions

- Reliable testing procedures and methodology, improved with time and experience.
- Ascospores inoculum alone may not create epidemics.
- Supplementing inoculation with ground sclerotinia-infected millet seed ensures good infections.
- Misting system creates the favourable conditions.
- Progress make since this process started in 2005.
- Selected hybrids show consistent results from year to year.
- Few genotypes better than the most resistant check.

Acknowledgement

- USA, National Sclerotinia Initiative (NSI)
- Agriculture and Agri-Food Canada (AAFC)
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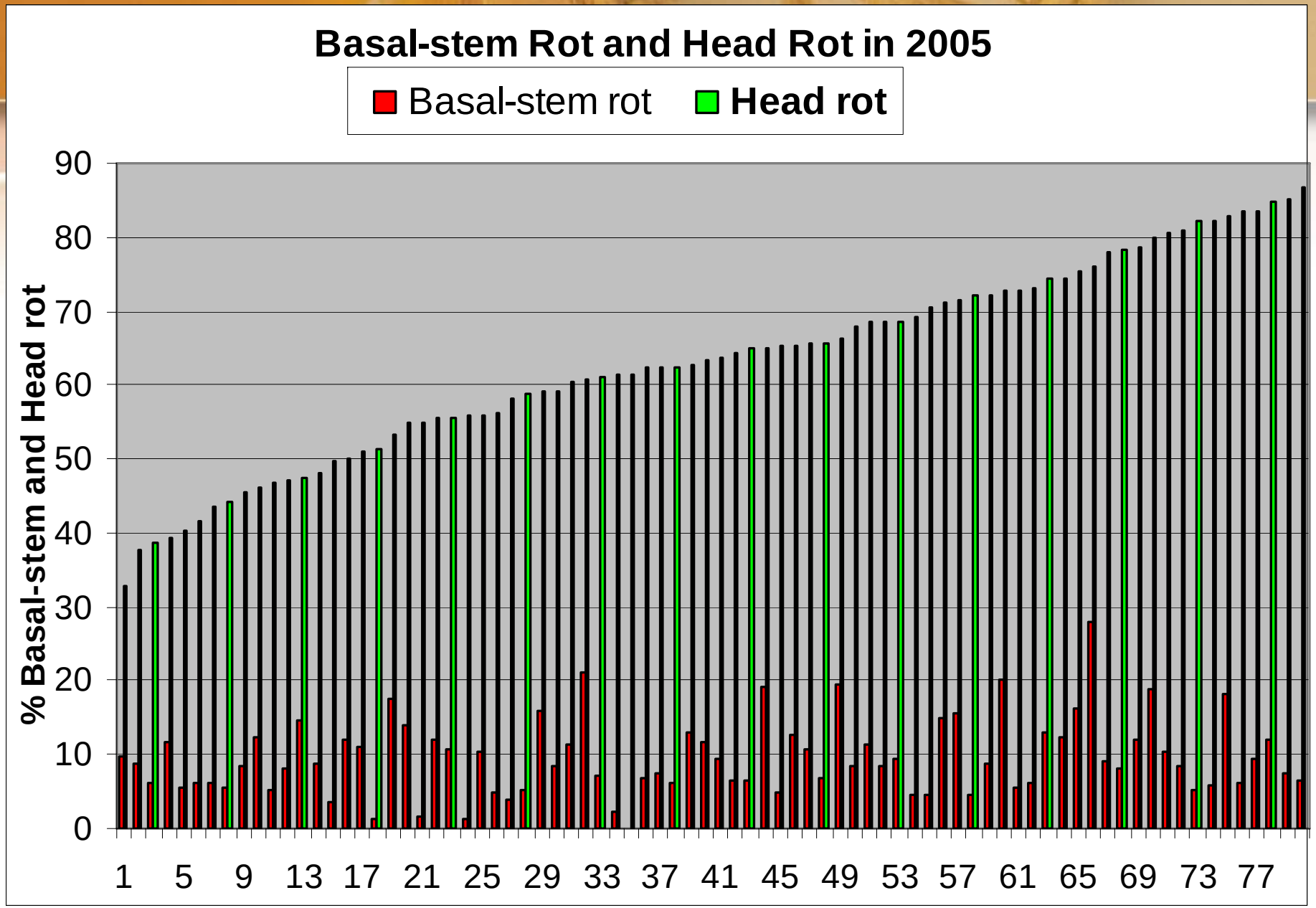
- Tricia Cabernel and Maurice Penner, Technical support.


Basal-stem Rot and Head Rot in 2005
Basal-stem rot
Head rot
% Basal-stem and Head rot
0
10
20
30
40
50
60
70
80
90
1
5
9
13
17
21
25
29
33
37
41
45
49
53
57
61
65
69
73
77