

**Measuring tolerance levels of
pre-released *Gossypium hirsutum* L.
Genotypes to *Verticillium dahliae* Kleb.**

Fredy Musiniwa
Washington Mubvekeri
Cotton Research Institute
P. Bag 765
Kadoma

Introduction

- ✓ Verticillium wilt is one of the most important diseases of cotton which affects yield and fibre quality in cotton worldwide (Karademir *et al.*, 2010).
- ✓ The disease is caused by a soil borne fungus called *Verticillium dahliae* Kleb
- ✓ Once verticillium wilt is introduced into the field, eradicating it is difficult because of its saprophytic ability

...Introduction

- ✓ there is no effective chemical control for the disease.
- ✓ the use of tolerant cultivars is of great importance in controlling the disease.
- ✓ Measuring V. wilt tolerance levels in new cotton genotypes is one of the major breeding goals at Cotton Research institute

Objective

- ✓ To determine tolerance levels of new cotton genotypes to verticillium wilt.

Materials and Methods

- ✓ **Study site**
- ✓ Cotton Research Institute
- ✓ 2 Experiments from MSHV breeding programs
- ✓ Treatments- 12 cotton genotypes
- ✓ Experimental Design- RCBD with 3 Reps
- ✓ Plot size- single row of 5.4m
- ✓ Measurements- %incidence, severity and seed cotton yield

Materials and Methods

✓ Infected plants were tagged with knitting wool of different colours from the period of February up to May.

✓ Percentage incidence was calculated per every plot at the end of the season

✓ Table 1. Scoring system for percentage incidence

% Incidence	Disease Rating	Symbol
0% - 9%	Highly Resistant	HR
10% - 19%	Resistant	R
20% - 29%	Tolerant	T
>30%	Susceptible	S

Materials and Methods

- ✓ Vascular browning was determined by cutting each plant cross sectionally after harvesting.
- ✓ Yield was measured per plot at the end of the season.



Materials and methods

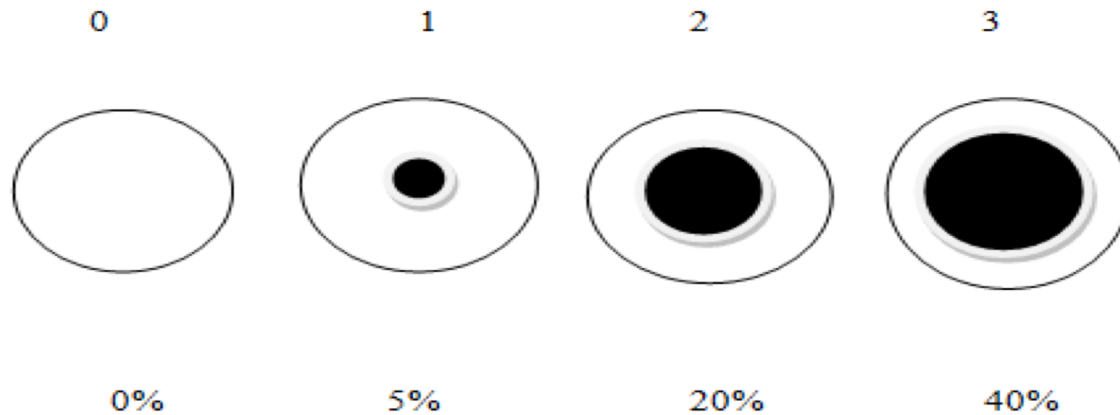


Fig 1: Vascular browning index for assessing disease severity

- ✓ 0 = no discolouration
- ✓ 1 = discolouration restricted to small spots or an area less than 5% of the stem cross section
- ✓ 2 = discolouration of between 5% and 20% of the stem cross section
- ✓ 3 = discolouration of between 20% and 40% of the stem cross section
- ✓ 4 = greater than 40% vascular discolouration of the stem cross section

Source - (Australian Cotton CRC. 2008.)

Materials and Methods

Data analysis

- ✓ Data on Incidence and severity was transformed using Arcsine and square root transformations respectively.
- ✓ Anova was conducted using Genstat 14th edition
- ✓ Mean separation was done using the Duncan Multiple Range Test at 5% level

Results and Discussions

Table 2: Verticillium wilt incidence, in MSHV1 trial conducted at CRI during 2015-16 seasons.

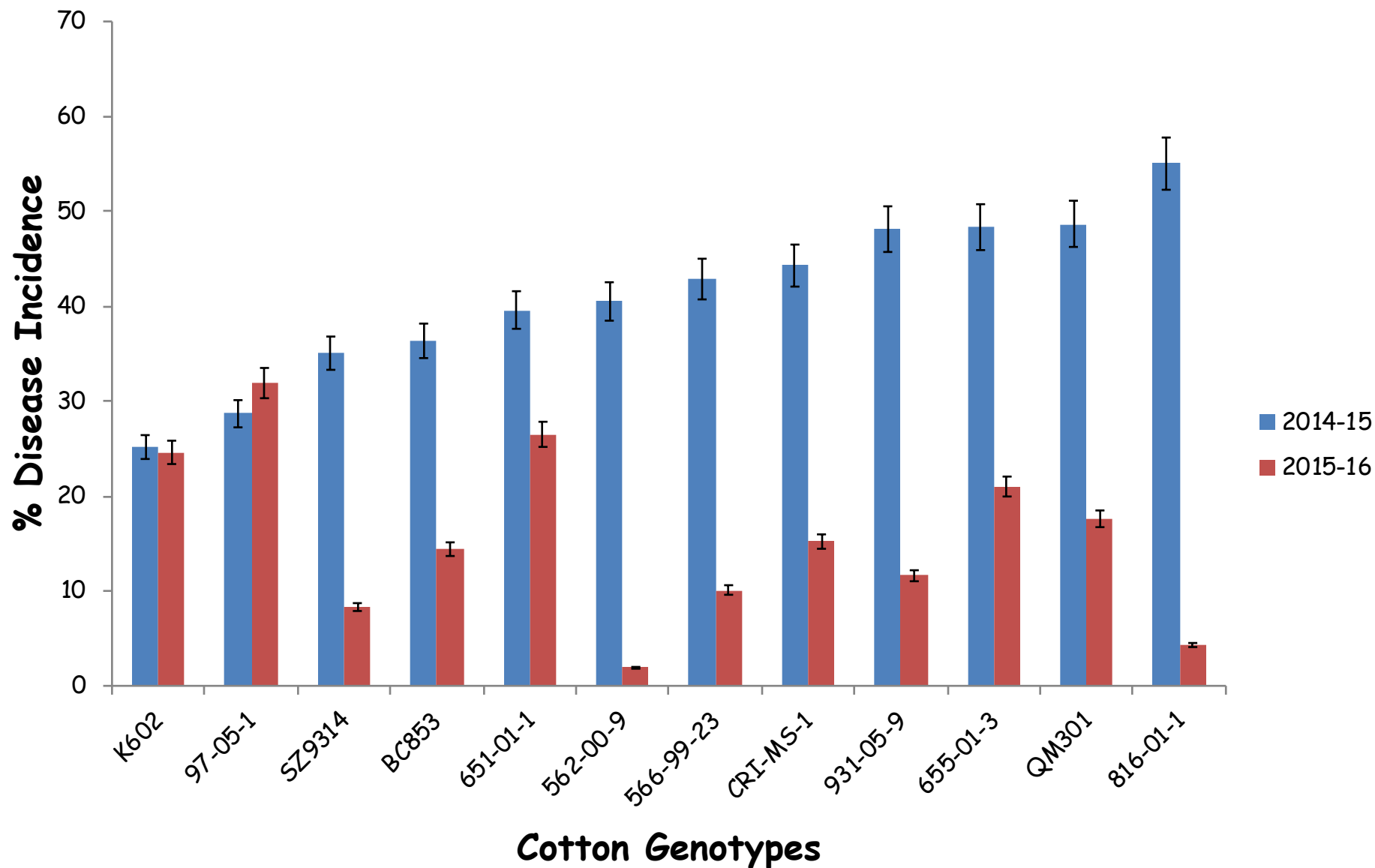


Table 3: Verticillium wilt severity and yield in MSHV1 trial conducted at CRI during 2015-16 seasons.

Season	2015	2016	2015-16
Genotype	Disease severity index	Disease severity index	Yield Kg/ha
K602	1.132b	0.300ab	2131
97-05-1	1.527c	0.800bc	2075
SZ9314	1.311bc	0.200a	1467
BC853	1.125b	0.333ab	1570
651-01-1	1.262bc	0.533ab	1041
562-00-9	0.812a	0.567ab	1609
566-99-23	1.190b	1.100c	1401
CRI-MS-1	1.191b	0.767bc	1645
931-05-9	1.435bc	0.533ab	1279
665-01-3	1.398bc	0.733abc	1739
QM301	1.168b	0.333ab	2052
816-01-1	1.188b	0.400ab	1094
Grand mean	0.778	0.6	1592
P value	0.008	0.029	0.212
CV	14.2	31	29

**Medium Staple Middle Veld
Varieties
MSHV4**

Table 3: Verticillium wilt incidence, severity and yield in MSHV4 trial conducted at CRI during 2015-16 seasons.

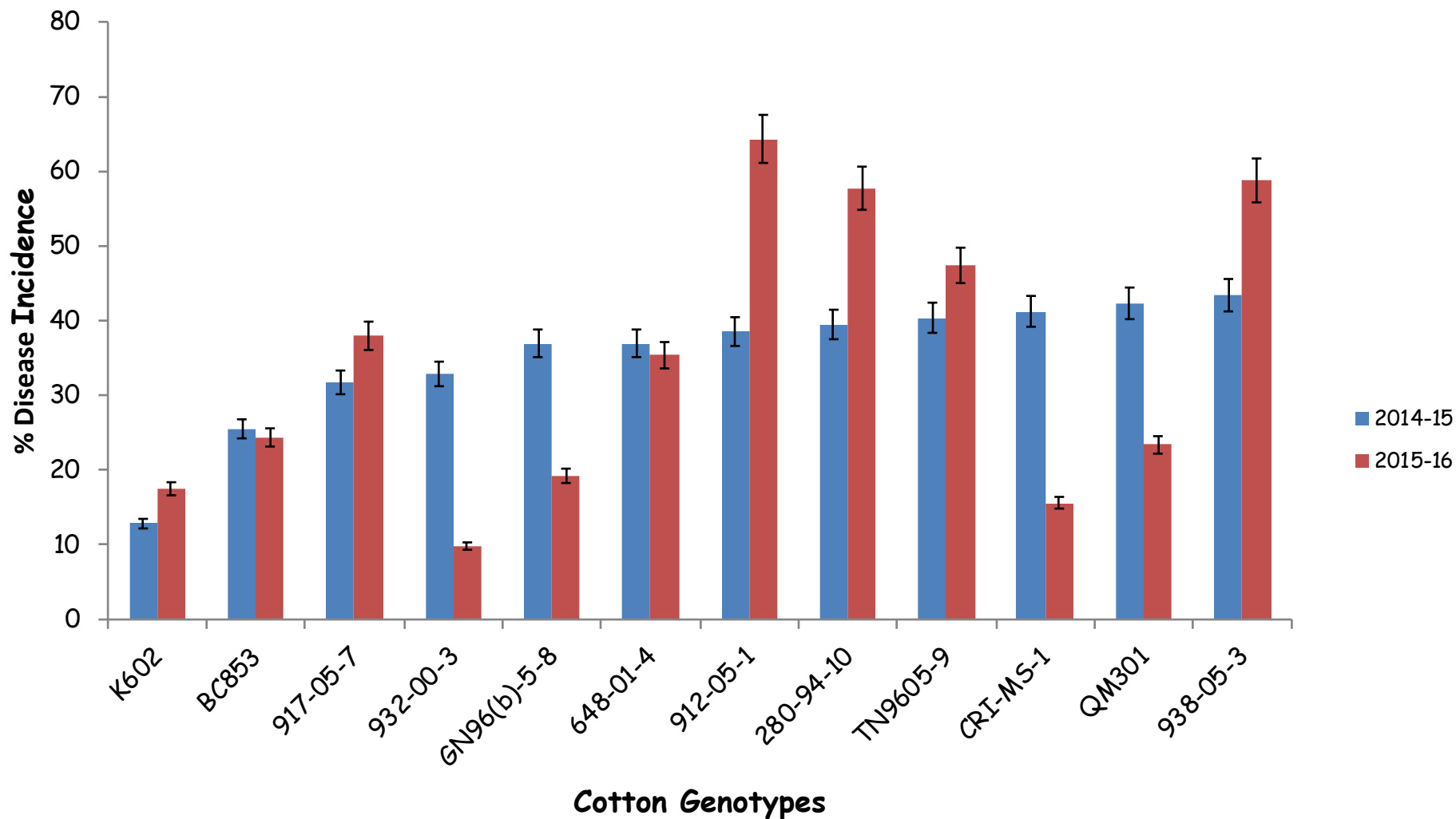


Table 3: Verticillium wilt severity and yield in MSHV4 trial conducted at CRI during 2015-16 seasons.

Season	2015	2016	2015	2016
Genotype	Disease severity index	Disease severity index	Yield Kg/ha	Yield Kg/ha
K602	1.00ab	0.700	3880c	1142abc
BC853	1.733bcd	1.000	1028ab	846ab
917-05-7	1.900cd	0.900	1654ab	988ab
932-00-3	0.567a	0.900	2386bc	1679c
GN96(b)-05-8	1.167abc	0.400	2438bc	1228bc
648-01-4	1.033ab	0.400	3687b	1377bc
912-05-1	2.233d	0.600	213a	633a
280-94-10	1.800bcd	0.400	1160ab	886ab
TN96-05-9	1.967cd	0.400	1718ab	1392bc
CRI-MS-1	1.233abc	1.100	1790ab	1269bc
QM301	1.267abc	1.000	1247ab	1358bc
938-05-3	2.167d	0.500	117a	957ab
Grand mean	1.506	0.700	1609	1146
P value	0.002	0.099	0.002	0.018
CV	29.2	31	33	26.4

Conclusion

- ✓ Verticillium wilt screening indicated that varieties had different tolerant levels to the disease.
- ✓ Most genotypes which were tolerant to the disease produced high yields.
- ✓ MSHV1-562-00-9
- ✓ MSHV6-932-00-3, GN96(b)-05-8 and 648-01-4

Recommendations

- Genotypes GN96(b)-05-8,932-00-3, 648-01-4 and 562-00-9 are recommended for further breeding advancement.
- Further research to determine the mode of tolerance

The end

Thank You!!!