Incidence of cotton bacterial blight on Sudanese open cotton cultivars in comparison with introduced open and *Bt* cotton cultivars in the Rahad scheme

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Introduction

- Cotton is affected by a number pests and diseases. Bacterial blight is caused by *Xanthomonus campestris* pv *malvacerum*, and it is one of the most destructive diseases and the only bacterial disease in many cotton growing areas that causes considerable damage in cotton.
- In Sudan the disease was first reported in 1922 by Tarr, the cultural and climatic conditions under which cotton is grown, favor the development and spread of the disease.

Introduction (Cont.)

- The disease in Sudan is reported to cause considerable crop losses and reduced cotton yield by 14-21% depending on the prevailing environmental conditions and developmental stage at which infection take place.
- Elimination of the disease can only take place by cultivation of genetically immune cultivars, and breeding for disease resistance was among the first seriously attempted control measures. The pathogen has an ability to develop new races in a cotton plot that was continuously cultivated for many years.

Cotton production in Rahad Scheme

- Cotton production in Rahad scheme was started in the early seventies. Different cultivars were sown, last 7 years the *Bt* cotton was introduced at experimental sites and sown commercially this season 2012/2013 in many cotton growing areas in irrigated as well as rain-fed areas.
- Our objective to this study was to report the incidence of bacterial blight for normal Sudanese cotton cultivars compared to the introduced Bt cultivars under Rahad scheme conditions.

- Symptoms of bacterial blight


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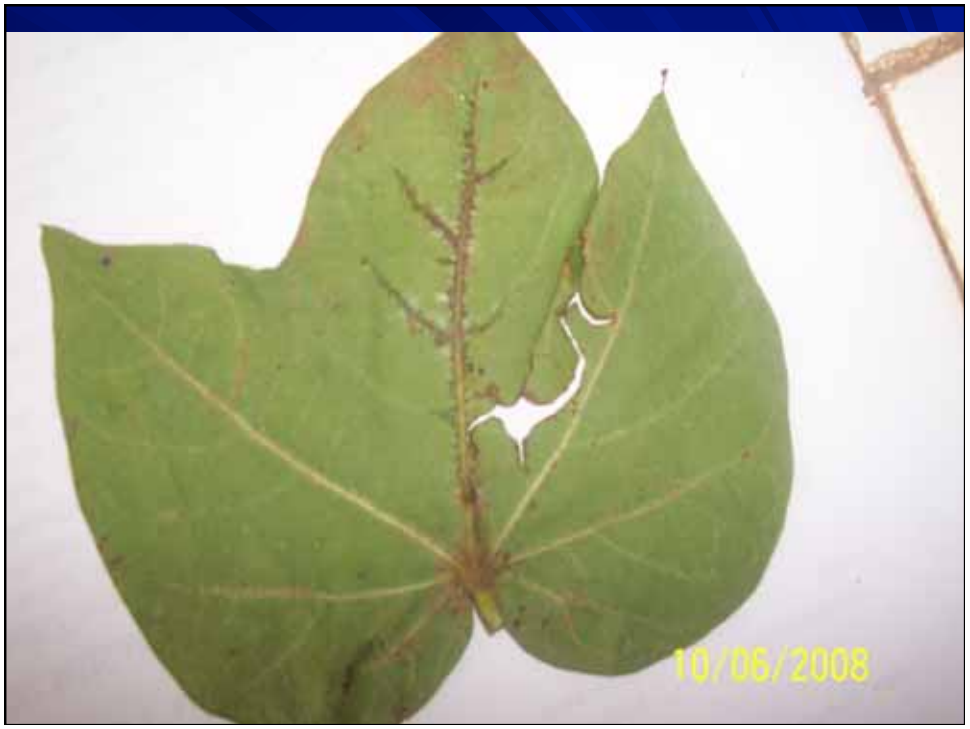
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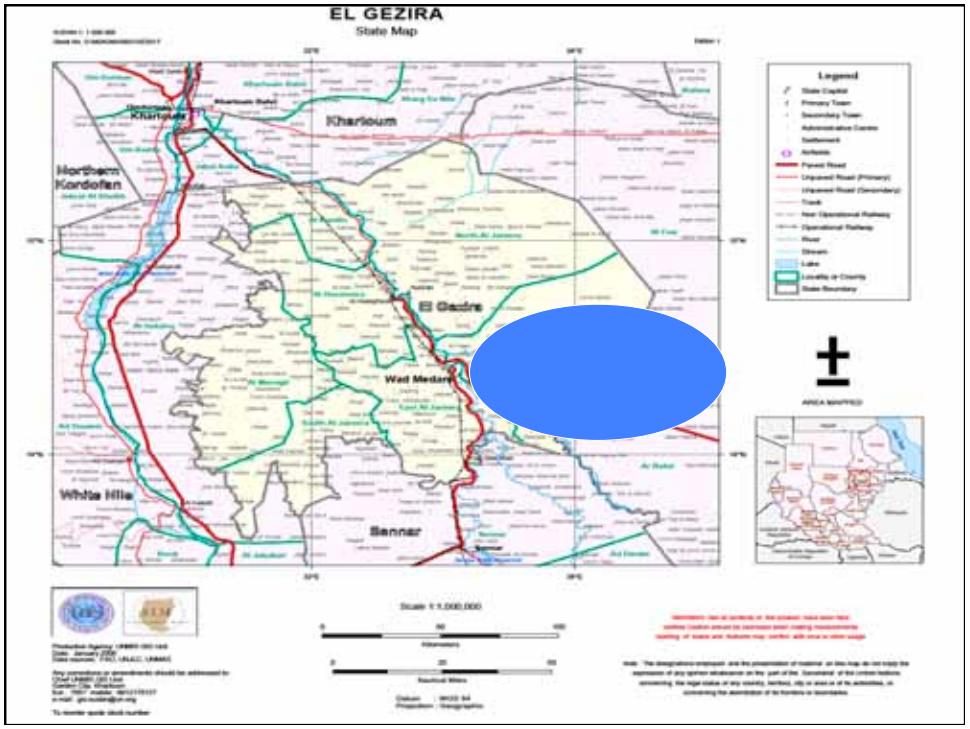
The incidence of the disease

- The incidence of bacterial blight (BB) was evaluated in Rahad scheme especially in Blocks 1, 2 and 3 with representative samples from blocks 7 and 8 at the Rahad scheme. The experimental sites at Rahad research station and China Technology Demonstration Centre (Block 4) were included. The survey was conducted in seasons 2006/2007 and season 2011/2012.
- All our popular cotton cultivars were found to be susceptible to the disease under Rahad conditions at least for block 4. The occurrence of new race or races of the disease in the Rahad scheme is claimed for.

Cotton bacterial blight in the Rahad scheme

- Rahad scheme was one of the sites that were chosen for the national cotton variety to be tested in, However no assessment for the disease was done to the tested or released cotton varieties. Since 2005; two surveys were carried out for cotton bacterial blight in the scheme. The first survey was for the growing season 2006/07 and the cultivated cotton variety grown was Barac (76)B while the second one was for the season 2011/12 and the cotton variety grown was Hamid.



Methodology for the first survey

- In this survey, the ten blocks of the scheme were covered and each block was represented by two villages. From each village two hawashas (5 feddans each) were chosen and each hawasha was represented by 3 samples 15 plants each. Two upper, two middle and two lower leaves and the bolls were assessed for the disease in each plant. Disease assessment was recorded as percentage for infected plants, leaves and bolls and the disease rating of 0- 5 was used for the over all disease severity , Where ,
- 0 = No infection
- 1 = 1- 10% of the leaf area is affected
- 2 = 11- 20% of the leaf area is affected
- 3 = 21 – 30% of the leaf area is affected
- 4 = 31 – 40% of the leaf area is affected
- 5 = ≥41% of the leaf area is affected.

Methodology for the second survey

- Blocks 1,2 and 3 were chosen to represent the southern part of the scheme while blocks 7 and 8 represented the northern part of the scheme. The central part was represented by block 4. The experimental sites Rahad research station and China Technology Demonstration Centre (Block 4) were included in the survey.

Cont.

- In the first survey, disease incidence was 100%, percent infected leaves was 71.7, over all disease severity was 2.3 and percent infected bolls was 8.0%. In the second survey the disease was only reported in block 4 which was 52.3% for disease incidence, 25.7% for infected leaves, 0.5% for over all disease severity and 0.5% for infected bolls. The Rahad research station reported 97.8% for disease incidence, 56.9 % for infected leaves, 1.1% for over all disease severity and 13.7% for infected bolls. Rain fall in the second survey ranged 150-300 mm/annum.

Table 1.Rahad Agricultural Scheme (Season 2006/07)

Block No.	% infected plants	% infected leaves	Over all disease severity	No of bolls/ plant	% infected bolls	Sowing date	% leaf sheddi ng
1	100	80.0	2.5	6.4	12.6	-	35.3
2	100	69.4	2.3	6.1	6.0	-	26.3
3	100	57.2	1.2	7.0	4.8	-	10.2
4	100	57.2	1.9	12.3	4.5	10/7	25.8
5	100	70.6	2.1	8.8	3.6	-	36.7
6	100	68.9	2.1	4.4	9.0	20/7	15.7
7	100	73.3	2.3	9.4	4.9	-	27.5
8	100	77.3	2.1	10.5	5.4	30/6	26.8
9	100	74.4	1.8	4.6	16.5	15/7	15.3
10	100	67.2	2.2	4.9	12.3	20/7	10.2
Mean	100	71.5	2.3	7.4	8.0	-	23.0

Table:2 Rahad Research Station (2006/07)

Variety	% infected plants	% infected leaves	disease severity	No of bolls/ plant	% infected bolls	Sowing date	Total rain fall (mm)
Nur	36.6	100	0.5	9.1	0.0	10/7	359

Table3. Rahad Scheme (2011/12)

Block No.	Village No	% infected plants	% infected leaves	Over all disease severity	No of bolls/ plant	% infected bolls	Sowing date	Total rain fall (mm)
1	7	0.0	0.0	0.0	7	0.0	15/7	160
2	4	0.0	0.0	0.0	9	0.0	12/7	-
3	13	0.0	0.0	0.0	8	0.0	1/7	150
7	33	0.0	0.0	0.0	15	0.0	22/6	300
8	38	0.0	0.0	0.0	12	0.0	27/6	-
4	17 S	0.0	0.0	0.0	11	.00	10/7	191
4	17 W	86.7	14.1	1.0	11	2.6	15/7	191
4	18 E	100	61.1	1.2	8	2.6	15/7	199
4	18 E	73.3	27.8	0.3	8	0.0	18/7	199
4	18 N	0.0	0.0	0.0	11	0.0	15/6	200
4	19	53.3	24.4	0.5	10	1.4	5/7	272
Mean Block 4	-	52.3	25.7	0.5	10	0.9	-	209

S = South W = West E = East N = North

Table:4. Rahad research station farm (Block 4) (Season 2011/12)

Cultivar	% infected plants	% infected leaves	Over all disease severity	No of bolls/ plant	% infected bolls	Sowing date	Total rain fall (mm)
Hamid	93.3	50.0	1.0	7	14.7	2/7	224
Abdeen	100	65.5	1.2	4	30.0	2/7	-
Wagar	100	61.1	1.2	6	6.5	1/7	-
Mean	97.8	56.9	1.1	6	13.7	-	-

Table:5.Sudan China Technology Demonstration Centre (Neighboring Rahad Station)

Cultivar	% infected plants	% infected leaves	Over all disease severity	No of bolls/ plant	% infected bolls	Sowing date	Total rain fall (mm)
Hamid	73.3	22.2	0.3	0.2	0.0	23/7	224
Abdeen	46.7	14.4	0.2	0.3	0.0	23/7	-
BT hybrid	53.5	16.7	0.2	1.3	0.0	23/7	-
OPV	86.7	22.2	0.4	1.5	0.0	23/7	
Mean	65.1	12.9	0.3	0.8	0.0	-	-

Conclusions

- 1- All our popular cotton cultivars are susceptible to the disease under Rahad conditions at least for block 4.This include as well the introduced open and hybrids Bt cotton from China.
- 2- The occurrence of new race or races of the disease in the Rahad scheme is claimed for.
- 3-More survey of the area is needed to investigate the situation, moreover molecular markers are going to be done to separate races of the pathogen.

Thank you for your attention