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Impact of Cotton Monoculture, Variety Selection, and Chemical Inputs on Disease Control, 2011

P. M. Phipps (pmphipps@vt.edu) and **D. E. P. Telenko** (darcy.telenko@vt.edu), Tidewater AREC, 6321 Holland Rd., Suffolk, VA 23437 and **J. D. Eisenback** (jon@vt.edu), Dept. Plant Pathology, Physiology & Weed Science, Virginia Tech, Blacksburg, VA 24061

Cotton was harvested on 115,000 acres in southeastern Virginia according to a December estimate by the Virginia Agricultural Statistics Service. The state average yield estimate was 793 lb/A or 1.65 bales/A. The value of lint was projected to average about $0.93/lb.

Disease Loss Estimate

Seedling diseases were estimated to reduce yield by 2% in 2011 (Table 1). The value of this loss to seedling diseases equaled 1.7 million dollars in grower income. Foliar diseases and boll rots caused yield losses that ranged from a trace up to 0.1%. Southern root-knot nematode, *Meloidogyne incognita*, caused the greatest loss of cotton yield in Virginia (Table 1). Other nematodes causing yield losses included stubby root, sting, common lance, and lesion nematodes. The occurrence of damage by reniform nematode, *Rotylenchulus reniformis*, continues to be limited to a few fields in Southampton County. As in previous years, the Columbia lance nematode was not detected in 2011. Yield losses to nematodes appeared to be greatest in fields planted continuously to cotton for 5 years or longer or in crop rotations with corn and soybeans. Losses to nematodes in 2011 were estimated to total 3.5 million dollars. The estimated loss in 2011 to all diseases totaled 6.1% of yield potential or 5.9 million pounds of lint, valued at 5.5 million dollars.

Table 1. Estimated loss of yield to cotton diseases in 2011

Disease	Causal agent(s)	Percent loss
Seedling disease	*Rhizoctonia solani*, *Pythium* spp.	2.0
Fusarium wilt	*Fusarium oxysporum* f. sp. *vasinfectum*	0
Verticillium wilt	*Verticillium dahlia*	0
Texas root rot	*Phymatotrichum omnivorum*	0
Ascochyta blight	*Ascochyta gossypii*	0
Bacterial blight	*Xanthomonas* spp.	trace
Boll rots	*Diplodia* spp., *Fusarium* spp., *Xanthomonas* spp.	0.10
Leaf spots	---various---	trace
Southern root-knot nematode	*Meloidogyne incognita*	2.50
Reniform nematode	*Rotylenchulus reniformis*	trace
Other nematodes	*Trichodorus* spp., *Belonolaimus* spp., etc.	1.5
Total loss (%)		6.1*

* The loss estimate equals 5.9 million pounds in Virginia based on production of 91.2 million pounds of lint in 2011. At a value of $0.93 per pound, the loss in revenues at the farm gate would total 5.5 million dollars.

Seasonal degree days, rainfall, and crop growth in 2011

Rainfall in May and Oct was 1.57 and 0.14 in. below normal, and rainfall in Jun, Jul, Aug and Sep was 0.06, 2.17, 8.41, and 4.37 in. above normal, respectively. Rainfall during the period totaled 40.98 in., which was 13.3 in. above normal (Table 2). Soil temperatures reached 60°F on 14 Apr and continued to warm throughout the planting period (Table 3). Cotton degree-days (DD_{60}) from 1 May to 31 Oct totaled 2593 in 2011, which was230 above the previous 5-yr average (Table 4) and were 353 above the 16-yr average (Table 5). Periods of low rainfall (12 Jul to 26 Aug) and above-normal temperatures (10 to 29 Jul) caused moderate to severe crop stress and reduced yield. Seasonal accumulations of degree days tracked above the 16-yr average throughout the growing season whereas accumulations of rainfall were moved above normal by Hurricane Irene with 13.7 in. of rainfall on 27 and 28 Aug (Fig 1, Table 2). Hurricane Irene produced winds ≥75 MPH that caused lodging and tangling of yield-bearing limbs. Harvest efficiency was hampered by the damaging winds and heavy rainfall which included 8.96 in. of rainfall in September.

Harvest began on 20 September and was near completion by the end of November. The first killing frosts in the Tidewater area were on 30 and 31 October when night-time temperatures ranged from a low of 28 to 31ºF.

Table 2. Monthly rainfall from 2005 to 2011 compared to the 78-yr mean (1933-2010)

	Rainfall (in.)							
Month	2005	2006	2007	2008	2009	2010	2011	Normal*
May	4.78	2.86	2.16	3.43	4.60	6.77	2.23	3.80
Jun	2.64	10.08	3.00	1.56	3.40	0.83	4.28	4.22
Jul	5.19	3.66	1.71	5.58	4.86	1.01	7.96	5.79
Aug	4.50	2.50	5.00	2.18	3.38	2.04	14.21	5.80
Sep	3.08	9.16	0.43	6.01	7.69	8.75	8.96	4.59
Oct	5.68	8.14	5.26	0.87	1.72	8.24	3.34	3.48
Total	25.87	36.40	17.56	19.63	25.65	27.64	40.98	27.68

*Normal is the 78-yr mean of records maintained at the Tidewater AREC, Suffolk, VA

Table 3. Soil temperatures at 4-in. depth in 2011 compared to previous five years (2006-2010)

10-day	Soil temperatures (ºF)*						
period	2006	2007	2008	2009	2010	2011	Mean*
Apr 1-10	58.1	57.1	57.4	56.0	62.8	54.5	58.3
Apr 11-20	62.0	54.8	61.0	57.5	61.6	62.5	59.4
Apr 21-30	63.9	67.2	64.4	64.3	62.4	66.7	64.4
May 1-10	62.8	64.4	68.0	69.0	71.1	66.1	67.1
May 11-20	65.8	67.2	65.2	66.1	68.2	69.2	66.5
May 21-30	70.2	74.2	68.6	72.3	73.0	76.7	71.7

*Based on daily records at 15 min. intervals at the Tidewater AREC, Suffolk

Table 4. Degree day accumulations in 2011 compared to previous 5 years (2006-2010)

	Cotton Degree Days (DD_{60})*						
Month	2006	2007	2008	2009	2010	2011	**Mean**
May	221	230	229	317	346	332	269
Jun	386	431	585	460	624	529	497
Jul	541	508	540	513	676	665	556
Aug	542	541	488	561	580	551	542
Sep	259	351	367	292	430	385	340
Oct	104	273	126	136	160	131	160
Total	2053	2334	2335	2279	2816	2593	2363

*Based on daily records at hourly intervals at the Tidewater AREC, Suffolk

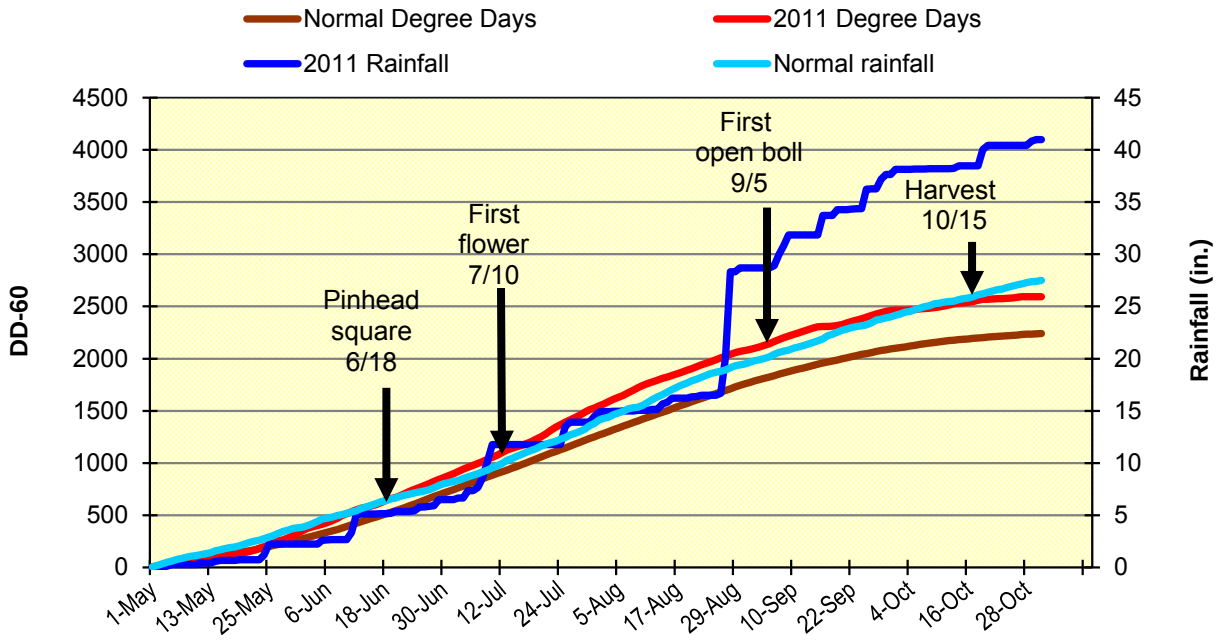

Figure 1. Degree days, rainfall and crop development in 2011 at Suffolk, VA

Pinhead square was delayed 3 days while first flower and first open boll occurred on the same day as the 16-yr average (Table 5). The November estimate for cotton yield in Virginia was 793 lb/A which was 73 lb below the 16-yr average for Suffolk.

Table 5. Relationship of total rainfall and degree-days to growth and yield of cotton over the past 16-yr period in the City of Suffolk

Year	Rainfall [z] (in.)	Degree-days (DD_{60})	Pinhead square	1st flower	1st Open boll	Lint [y] (lb/A)
1995	23.83	2162	7-Jun	10-Jul	6-Sep	703
1996	35.43	2068	11-Jun	10-Jul	5-Sep	662
1997	20.09	1900	16-Jun	15-Jul	15-Sep	587
1998	24.94	2303	12-Jun	8-Jul	1-Sep	821
1999	49.71	2056	14-Jun	13-Jul	13-Sep	697
2000	27.27	2132	12-Jun	10-Jul	10-Sep	948
2001	22.72	2255	15-Jun	13-Jul	5-Sep	922
2002	21.24	2498	17-Jun	7-Jul	2-Sep	473
2003	35.93	2166	27-Jun	18-Jul	14-Sep	831
2004	43.07	2191	4-Jun	2-Jul	30-Aug	1159
2005	25.87	2297	27-Jun	13-Jul	6-Sep	1082
2006	36.40	2053	21-Jun	13-Jul	3-Sep	822
2007	17.56	2334	15-Jun	11-Jul	5-Sep	988
2008	19.63	2335	16-Jun	15-Jul	8-Sep	1341
2009	25.65	2279	14-Jun	7-Jul	1-Sep	1113
2010	27.64	2816	14-Jun	28 Jun	31 Aug	700
16-yr average	28.56	2240	15-Jun	10-Jul	5-Sep	866
2011	40.98	2593	18-Jun	10-Jul	5-Sep	793[x]

[z]Rainfall records for May through Oct at the Tidewater AREC in Suffolk, VA.
[y]Lint yields (1995-2010) are for the City of Suffolk according to the Virginia Agricultural Statistics Service.
[x]Yield estimate for 2011 is based on the October estimate for Virginia.

Seedling Disease Control Trials

National cotton seed treatment trial (Tidewater Research Farm, Suffolk). The trial was conducted in Kenansville loamy fine sand that was prepared for planting by under-the-row ripping and strip tilling into a cover crop of wheat. Treatments were replicated in four, randomized complete blocks. Seed of DP 0935 B2RF were planted on 14 April at a rate of 3 seed/ft spaced ca. 4 in. apart in each row. Plots were two, 30-ft rows spaced 36-in. apart. Temik 15G at 5 lb/A was applied to the seed furrow at planting. The trial was managed according to standard practices in Virginia. Plots were harvested with a two-row harvester on 10 October.

Soil temperature at the 4-in. depth was 61.4° F at planting and averaged 62.9° F up to 7 days after planting. Rainfall totaled 0.19 in. in the same period. Numbers of dead plants with symptoms of seedling disease at 4 weeks after planting were not significantly different across treatments (Table 6). Counts of healthy seedlings on 16 May and yield on 10 Oct were not improved significantly by seed treatments.

Table 6. Effect of seed treatment on emergence, seedling disease and yield in cotton (CotSeedFun111)

Treatment and rate/cwt seed	Dead plants/plot* (12 May)	Healthy plants/ft* (16 May)	Yield** lb/A	Yield** bales/A
Baytan 30 0.75 fl oz + Allegiance FL 1.5 fl oz + Vortex FL 0.08 + SP1020 0.32 fl oz	8.8	1.91	1258	1.19
Baytan 30 0.5 fl oz + Allegiance FL 0.75 fl oz + Vortex FL 0.08 fl oz	8.5	1.93	1355	1.28
Apron XL 0.32 fl oz + Maxim 4FS 0.08 fl oz + Systhane 40 WP 0.84 oz	6.3	1.85	1258	1.19
Apron XL 0.32 fl oz + Maxim 4FS 0.08 fl oz + Systhane 40 WP 0.84 oz + Dynasty CST 4.13 fl oz	12.3	1.85	1363	1.29
Apron XL 0.32 fl oz + Maxim 4FS 0.08 fl oz + Systhane 40 WP 0.84 oz + Dynasty CST 4.13 fl oz + Bion 0.03 fl oz	6.5	1.80	1299	1.23
Apron XL 0.32 fl oz + Maxim 4FS 0.08 fl oz + Systhane 40 WP 0.84 oz + Apron XL 0.32 fl oz + Maxim 4FS 0.30 fl oz + Dynasty 100FS 1.53 fl oz	9.5	1.74	1299	1.23
Confidential EXP	8.5	1.80	1186	1.12
Vitavax-PCNB 6.0 fl oz + Allegiance 0.75 fl oz	10.3	1.62	1307	1.24
RTU Baytan Thiram 3.0 fl oz + Allegiance FL 0.75 fl oz	16.0	1.69	1137	1.08
RTU-PCNB 14.5 fl oz	9.3	1.91	1283	1.22
Allegiance FL 1.5 fl oz	8.8	1.71	1129	1.07
Baytan 30 0.5 fl oz + Allegiance FL 0.75 fl oz + Vortex FL 0.08 fl (no Cruiser)	11.0	1.74	1202	1.14
Nontreated	7.3	1.62	1218	1.15
P(F)	.8827	.4594	.8985	.8985

* Determined from counts of two, 30-ft rows per plot.
** Weight (lb/A) includes lint + seed; bales/A are weight of lint only. Lint was 45.5% of weight and 480 lb/bale. Plots were harvested on 10 Oct.
Means are not significantly different according to Fisher's Protected LSD (*P*=0.05).

Response of low and high vigor seed to fungicides (Tidewater Research Farm, Suffolk).
Land preparation included under the row ripping and strip tilling into a cover crop of wheat. The soil type was Kenansville loamy sand that was planted to cotton, corn and peanut in 2008, 2009 and 2010, respectively. Personnel at Bayer CropScience obtained "black seed" of ST 4554 B2RF with high vigor and half of seed were subjected to hot water treatment to reduce seed vigor. The resulting high vigor and low vigor seed were treated with various fungicide treatments and a non-treated fraction of each lot was used as a check. Temik 15G 5 lb/A was applied to the seed furrow in all plots at planting on 14 April. Seed were planted 0.50 to 0.75 in. deep at a rate of 3 seed/ft of row. Plots were two, 30-ft rows spaced 3 ft apart. A split-plot design was used with fungicide treatment in main plots and subplots of low- and high-vigor seed in four randomized complete blocks. Standard practices for cotton production were followed after planting. Counts of emerged seedlings were recorded at 14 and 28 days after planting (DAP). Additional data included plant height, flower counts, open boll counts and yield. Plots were harvested on 10 October with a two-row harvester.

Soil temperature at the 4-in. depth was 61.4° F at planting and averaged 62.9° F up to 7 days after planting. Rainfall totaled 0.19 in. in the same period. Poncho Votivo applied to fungicide-treated seed reduced stand counts and flower counts in plots planted to low and high vigor seed; only yield from low vigor seed was reduced significantly by Poncho Votivo (Table 7). Fungicide treatments on seed with or without in-furrow fungicide increased stand count, flower count, and yield of cotton. The addition of in-furrow fungicide (Quadris/Ridomil Gold) and/or a seed fungicide overcoat (Trilex Advanced) did not significantly improve the performance of the base fungicide treatment (Baytan/Vortex/Allegiance).

Table 7. Effect of seed vigor and fungicide treatments on emergence, growth and yield of cotton (CotSeedFun311)

	Plants/ft (12 May)[y]		Flowers/12 ft (28 Jun)[x]		Yield (bales/A)[w]	
Treatment and rate/cwt seed[z]	Low vigor seed	High vigor seed	Low vigor seed	High vigor seed	Low vigor seed	High vigor seed
Untreated	0.45 c	2.05 bc	4.5 d	14.5 a	0.86 c	1.46
Baytan 0.5 fl oz + Vortex 0.08 fl oz + Allegiance FL 0.75 fl oz (S)	1.52 a	2.34 a	9.5 bc	15.0 a	1.28 ab	1.48
Baytan 0.5 fl oz + Vortex 0.08 fl oz + Allegiance FL 0.75 fl oz + Trilex Advanced 1.64 fl oz (S)	1.66 a	2.34 a	14.3 a	15.0 a	1.38 a	1.45
Baytan 0.5 fl oz + Vortex 0.08 fl oz + Allegiance FL 0.75 fl oz + Trilex Advanced 1.64 fl oz + Poncho Votivo 12.7 fl oz (S)	0.95 b	1.89 c	7.0 cd	7.5 b	1.08 bc	1.44
Baytan 0.5 fl oz + Vortex 0.08 fl oz + Allegiance FL 0.75 fl oz (S) Quadris2.08F 8.7 fl oz + Ridomil Gold 1.7 fl oz/A (F)	1.43 a	2.21 ab	11.5 ab	15.5 a	1.14 ab	1.56
P(F)	.0001	.0021	.0037	.0977	.0511	.8472

[z] S=seed treatment, F=in furrow.
[y] Determined from counts of two, 30-ft rows per plot.
[x] Number of flowers in two, 6-ft sections/row in each plot.
[w] Weight (lb/A) includes lint + seed; bales/A are weight of lint only. Lint was determined by ginning samples from each seed lot. One bale equals 480 lb. Plots were harvested on 10 Oct.
Means in a column followed by the same letter(s) are not significantly different according to Fisher's Protected LSD (P=0.05) , except for P>0.05 and $P \leq 0.10$ analysis for mean comparison was at P=0.10.

Nematode Control Trials in 2011

Response of eight varieties to Temik 15G in-furrow for nematode control (Morgan Farm, Suffolk, VA). Soil at the field site was Rumford loamy fine sand and was prepared for planting by ripping and strip-tilling rows into stale beds of cotton from the previous season. Crop history at the site was continuous planting of cotton since 2000, and root damage by southern root-knot nematode. A split-plot design was used with replications in four randomized complete blocks. Varieties were main plots of four 30-ft long rows spaced 36 in. apart and subplots were two rows of each treatment. The treatment with Temik 15G at 5 lb/A was applied to the seed furrow (F) at planting on 9 May. Foliar sprays of Orthene 97S at 6 oz/A on 26 May and 8 oz/A on 14 Jun were applied for thrips control, and Baythroid XL at 4 fl oz/A was applied on 15 Aug for bollworm control. Standard practices were followed for managing soil fertility, crop growth, and weed control in Virginia. Soil samples for determining nematode populations were collected on 28 Sep, and a composite sample of replications was processed from each variety and treatment with a soil elutriator and the sugar-flotation method. All plots were harvested with a two-row spindle picker on 27 Oct.

Stand counts of varieties averaged from 1.85 to 2.79 plants/ft of row on 6 Jun (Table 8). PHY 367 WRF had the highest stand count, while DP 1028 B2BF had the lowest. Temik 15G 5 lb/A (F) increased stand count compared to the untreated control. Varieties were not different for thrips injury, but Temik 15G 5 lb/A (F) significantly reduced thrips injury over untreated in all varieties except ST 5288 B2RF. Plant height was not different between varieties on 13 Jul. Temik 15G 5 lb/A (F) increased plant height in DP 1032 B2RF, ST 5458 B2RF, PHY 367 WRF, and AM 1550 B2RF. Flower counts on 13 Jul were significantly higher in PHY 367 WRF, ST 5288 B2RF, and PHY 375 WRF compared to DP 1028 B2RF, DG 2570 B2RF, ST 5458 B2RF, and AM 1550 B2RF. Temik 15G 5 lb/A (F) increased flowering over the untreated check on 13 Jul. Southern root-knot nematode was the primary nematode problem at the trial site but counts were low compared to previous years and ranged only up to 170 juveniles/500 cc soil. There was no main effect of variety or treatment on root-knot galling on 28 Sep. Other nematodes in soil included stunt and spiral at numbers ranging up to 80/500 cc soil. Temik 15G 5 lb/A decreased galling in DP 1028 B2RF, but increased galling on AM 1550 B2RF, and had no effect on galling in the other varieties. There were no differences in yield for varieties (P=0.3381) or treatment (P=0.9857).

Table 8. Response of eight varieties to Temik 15G in-furrow for nematode control (CotVarNema111)

Variety (cool germ.), and treatment [z]	Plants/ft [y] (6 Jun)	Thrips injury [x] (14 Jun)	Plant ht. [w] (in.) (13 Jul)	Flowers/ 12 ft [v] (13 Jul)	Root-knot galling [u] (28 Sep)	Lint yield [t] (bales/A)
DP 1028 B2RF						
Untreated Check	1.85	2.5 a	28.0	14.5	1.3 a	1.01
Temik 15G 5 lb/A (F)	2.02	1.5 b	28.2	12.5	0.6 b	1.06
DP 1032 B2RF						
Untreated Check	2.02	2.5 a	27.1 b	19.0	2.9	0.90
Temik 15G 5 lb/A (F)	2.27	1.5 b	28.4 a	22.8	1.7	0.97
ST 5288 B2RF						
Untreated Check	2.46	1.5	26.5	24.0	1.4	1.05
Temik 15G 5 lb/A (F)	2.52	1.0	26.5	26.3	2.0	1.09
ST 5458 B2RF						
Untreated Check	2.17	2.0 a	25.3 b	18.3	0.9	0.94
Temik 15G 5 lb/A (F)	2.02	1.0 b	26.2 a	19.5	0.6	1.00
PHY 367 WRF						
Untreated Check	2.56	2.0 a	25.8 b	21.5	1.1	1.17
Temik 15G 5 lb/A (F)	2.79	1.3 b	28.0 a	29.3	1.1	1.16
PHY 375 WRF						
Untreated Check	2.02	2.0 a	27.3	20.5	2.2	0.88
Temik 15G 5 lb/A (F)	2.08	1.3 b	28.0	27.0	2.5	0.80
AM 1550 B2RF						
Untreated Check	2.13 b	2.5 a	25.6 b	15.5 b	1.8	1.14
Temik 15G 5 lb/A (F)	2.73 a	1.3 b	27.0 a	23.0 a	1.6	1.09
DG 2570 B2RF						
Untreated Check	2.29	2.8 a	26.1	15.8	1.5 b	1.11
Temik 15G 5 lb/A (F)	2.31	1.5 b	26.8	17.8	2.5 a	1.26
Variety mean						
DP 1028 B2RF	1.94 d	2.0	28.1	13.5 e	0.9	1.03
DP 1032 B2RF	2.15 cd	2.0	27.8	20.9 bc	1.9	0.94
ST 5288 B2RF	2.49 ab	1.3	26.5	25.1 a	1.7	1.07
ST 5458 B2RF	2.09 cd	1.5	25.7	18.9 cd	0.8	0.97
PHY 367 WRF	2.68 a	1.6	26.9	25.4 a	1.1	1.17
PHY 375 WRF	2.05 cd	1.6	27.7	23.8 ab	2.3	0.84
AM 1550 B2RF	2.43 ab	1.9	26.3	19.3 cd	1.7	1.11
DG 2570 B2RF	2.30 bc	2.1	26.5	16.8 de	2.0	1.19
Treatment mean						
Untreated check	2.19 b	2.2 a	26.5	18.9 b	1.5	1.03
Temik 15G 5 lb/A (F)	2.34 a	1.3 b	27.4	22.0 a	1.6	1.05
Split plot analysis, P(F)						
Variety	.0002	.1963	.0416	.0009	.3279	.3381
Treatment	.0234	.0001	.0001	.0022	.7808	.6701
Variety x treatment	.2261	.4112	.0373	.0567	.0510	.9857

[z] F=in seed furrow at planting.
[y] Counts of two, 30-ft rows/plot.
[x] Thrips damage rating: 0=no damage, 10= severe damage.
[w] Measurements of six plants per plot.
[v] Counts of flowers in a 6-ft section of each row/plot.
[u] Roots of four plants per plot were scored according to percent of roots with galls: 0=none, 1=1-10%, 2=11-25%, 3=26-50%, 4=51-75%, 5=76-90%, 6=91-100%.
[t] Yield of lint was determined by ginning samples of seed cotton from each variety. One bale of lint equals 480 lb.
Means followed by the same letter(s) in a column and group were not significantly different at $P \leq 0.05$.

Response of three cotton varieties to seed treatments with and without foliar treatments compared to Temik 15G in-furrow for nematode control (Morgan farm, Suffolk, VA). Soil at the field site was Rumford loamy fine sand and was prepared for planting by ripping and strip-tilling rows into stale beds of cotton from the previous season. Cotton was grown annually at the field site since 2000, and had a history of root damage by Southern root-knot nematode. A split-plot design was used with replications in four randomized complete blocks. Varieties were main plots of ten, 30-ft rows spaced 36 in. apart and subplots were two rows of each treatment. Personnel with Bayer CropScience obtained seed of each variety and applied seed treatments. The treatment with Temik 15G 5 lb/A (F) was applied to the seed furrow at planting on 9 May. The treatment with CMT 4586 was applied over each row in a volume of 8 gal/A on 8 Jun with one 8002 nozzle/row and at 16 gal/A on 23 Jun with two 8002 nozzles/row. Foliar sprays of Orthene 97S at 6 oz/A on 26 May, and Baythroid XL at 4 fl oz/A on 15 Aug were applied to all plots for insect control. Standard practices were followed for managing fertility, cotton growth, and weed control in Virginia. Soil samples for determining nematode populations were collected on 28 Jul, and a composite sample of replications was processed from each variety and treatment with a soil elutriator and the sugar-flotation method. All plots were harvested with a two-row spindle picker on 27 Oct.

Stand counts of varieties averaged from 1.56 to 1.73 plants/ft of row on 6 Jun and were not significantly different for variety or treatment (Table 9). Temik 15G (F) significantly reduced thrips injury, but no differences were detected in varieties. Plant height on 7 Jul was increased significantly by Temik 15G (F) in ST 5458 B2F, however, the main effect of variety and treatment was not determined due to a significant treatment-by-variety interaction. Flower counts on 14 Jul were significantly higher in ST 4288 B2F and lowest in ST 5458 B2F, but the effect of Temik 15G 5 lb/A was significant only in ST 5458 B2F. Open bolls on 13 Sep were highest in FM 1740 B2R and significantly lower in ST 5458 B2F and ST4288 B2F. The effect of treatments on open bolls was not significant. Nematode counts/500cc soil were relatively low compared to previous years at this site and ranged up to 90 for southern root-knot, 40 for stunt, 50 for spiral, and 10 for stubby root. Root galling was significantly different between varieties (highest in FM 1740 B2R, moderate in ST 5458 B2F, lowest in ST 4288 B2F). The effects of treatment and variety on yield were not significant.

Table 9. Response of cotton varieties to seed and/or foliar nematicide compared to Temik 15G in-furrow, Morgan Farm, Suffolk, VA (CotVarNema211)

Variety and treatment[z]	Plants /ft[y] (6 Jun)	Thrips injury[x] (13 Jun)	Plant ht. (in.)[w] (7 Jul)	Flowers/ 12 ft[v] (14 Jul)	Open bolls[u] (13 Sep)	Root galling[t] (20 Sep)	Lint yield[s] (bales/A)
ST 5458 B2F							
Gaucho 600 0.5 mg a.i./seed (S)	1.65	1.8 a	21.8 b	22.8 bc	7.1	2.5	1.17
Gaucho 600 0.5 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S)	1.73	1.8 a	22.1 b	23.0 b	7.1	2.5	1.12
Aeris 0.75 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S)	1.56	2.0 a	21.9 b	19.3 c	6.9	1.6	1.05
Aeris 0.75 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S) CMT4586 8 fl oz/A (SP, 6/8, 6/23)	1.54	1.8 a	22.4 ab	23.5 ab	7.4	2.6	1.02
Temik 15G 5 lb/A (F)	1.72	1.0 b	22.9 a	26.8 a	7.0	2.0	1.16
ST 4288 B2F							
Gaucho 600 0.5 mg a.i./seed (S)	1.60	2.0 a	24.1	28.3	7.0	1.1 b	1.05
Gaucho 600 0.5 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S)	1.66	2.3 a	23.3	26.8	7.0	1.1 b	1.14
Aeris 0.75 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S)	1.63	2.0 a	24.2	24.0	7.1	2.0 a	1.15
Aeris 0.75 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S) CMT4586 8 fl oz/A (SP, 6/8, 6/23)	1.58	2.0 a	23.4	23.0	6.5	0.8 b	1.01
Temik 15G 5 lb/A (F)	1.59	1.0 b	23.8	25.5	6.9	1.1 b	1.03
FM 1740 B2R							
Gaucho 600 0.5 mg a.i./seed (S)	1.69	2.0	22.6 ab	24.5	7.5	3.3	1.12
Gaucho 600 0.5 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S)	1.68	2.3	23.1 a	25.5	7.6	3.2	0.98
Aeris 0.75 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S)	1.65	2.0	22.0 b	25.0	8.0	3.7	1.11
Aeris 0.75 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S) CMT4586 8 fl oz/A (SP, 6/8, 6/23)	1.63	2.0	23.3 a	22.3	7.8	3.0	1.01
Temik 15G 5 lb/A (F)	1.63	1.5	22.6 ab	25.3	7.5	3.0	1.07
Variety mean							
ST 5458 B2F	1.64	1.7	22.2	23.1 b	7.1 b	2.2 b	1.01
ST 4288 B2F	1.61	1.9	23.0	25.5 a	6.9 b	1.2 c	1.08
FM 1740 B2R	1.66	2.0	22.7	24.5 ab	7.7 a	3.2 a	1.06
Treatment mean							
Gaucho 600 0.5 mg a.i./seed (S)	1.65	1.9 a	22.8	25.2	7.2	2.3	1.11
Gaucho 600 0.5 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S)	1.69	2.1 a	22.8	25.1	7.3	2.3	1.08
Aeris 0.75 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S)	1.61	2.0 a	22.7	22.8	7.3	2.4	1.11
Aeris 0.75 mg a.i. + Poncho Votivo 0.424 mg a.i./seed (S) CMT4586 8 fl oz/A (SP, 6/8, 6/23)	1.58	1.9 a	23.0	22.9	7.2	2.1	1.01
Temik 15G 5 lb/A (F)	1.65	1.2 b	23.1	25.8	7.1	2.0	1.09
***Split-plot analysis, P*(F)**							
Variety	.5046	.1780	.0699	.0920	.0301	.0599	.9651
Treatment	.4489	.0001	.5239	.1248	.8424	.6833	.5514
Treatment x variety	.8833	.7331	.0061	.3469	.2989	.2050	.7416

[z]S=seed treatment, F=in furrow, SP=foliar spray. [y]Counts in two, 30-ft rows per plot. [x]Thrips damage rating scale: 0=none, 10=severe. [w]Heights are mean of three plants/row in each plot. [v]Determined from counts on three plants/row in each plot. [u]Number of open bolls in a 6-ft section of each row/plot. [t]Mean of four plants per plot (0=none, 1=1-10%, 2=11-25%, 3=26-50%, 4=51-75%, 5=76-90%, 6=91-100% of roots with galls on 20 Sep. [s]Yield (bales/A) was determined by ginning a sample from each variety. Plots were harvested on 27 Oct. Means followed by the same letter(s) in a column and group are not significantly different according to Fisher's Protected LSD (*P*=0.05). Means in a column and group with P≥0.05 and ≤0.10 were analyzed at P=0.10.

Comparison of cotton seed and in-furrow treatments for thrips and nematode control (Morgan farm and Tidewater AREC Farm, Suffolk, VA). Field trials evaluated cotton seed and in-furrow treatments for nematode control in a Rumford loamy fine sand (trial 1) and Kenansville loamy sand (trial 2). Trial 1 (Morgan Farm) had a history of cotton since 2000 and Trial 2 (Tidewater AREC) had a history cotton in 3-yr rotations with corn and peanut. Both field trials were prepared for planting by ripping and strip-tilling rows into cotton stubble in trial one and wheat cover crop in trial two. Treatments at both locations were applied to the same seed lot of PHY 367 WRF treated with a base treatment of Baytan/Vortex/Allegiance. Treatments were planted on 13 May in two, 30-ft rows spaced 36-in. apart in four randomized complete blocks in both trials. The seed treatments with Gaucho 600FS (O) and Aeris 0.75 (O) were applied by personnel with Bayer CropScience. Cruiser 600FS and Avicta 500FS were applied by personnel with Syngenta Crop Protection. Treatments with Temik 15G 5 lb/A (F), Larvin 3.2F (F), and AgriMek 0.15 EC (F) were applied to the seed furrow at planting in both trials. Temik 15G was applied with a Noble box to the seed furrow, whereas Larvin 3.2F, and AgriMek 0.15EC were applied through a microtube to each seed furrow in a volume of 5 gal/A. A foliar spray of Orthene 97S at 6 oz/A and 8 oz/A was applied for thrips control on 26 May in trials one and two, respectively. Baythroid XL at 4 fl oz/A on 15 Aug and 19 Jul was applied for control of bollworm in trials one and two, respectively. Standard practices were followed for managing soil fertility, cotton growth, and weed control. All plots were harvested with a two-row spindle picker on 27 and 10 Oct in trials one and two, respectively.

Stand counts averaged from 1.7 to 2.21 and from 1.73 to 2.37 plants/ft of row in trials one and two, respectively (Table 10). The effects of seed treatments on stand was not significant in trial one, but Cruiser 600FS 0.34 mg a.i./seed (O) in trial two resulted in a significantly higher stand than all other treatments while Cruiser 600FS 0.34 mg a.i./seed (O) + Avicta 500FS 0.15 mg a.i./seed (O) had the lowest stand. In trial one, Temik 15G (F) significantly reduced thrips injury in cotton on 14 Jun over all other treatments. Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 7.02 fl oz/A (F) had the highest thrips injury but was only significantly different from the seed treatment with Gaucho 600 FS 6.39 fl oz/cwt (O) or Temik 15G (F). Thrips injury and plant height were not significantly different across all treatments in trial two. Gaucho 600FS 6.39 fl oz/cwt (O) significantly increased plant height in trial one over all treatments, except Cruiser 600FS 0.34 mg a.i./seed (O) + Avicta 500FS 0.15 mg a.i./seed (O), while Cruiser 600FS 0.34 mg a.i./seed (O) alone had the shortest plant height. Root-knot nematode galling was detected only in trial one. Gaucho 600FS 6.39 fl oz/cwt (O) + Larvin 3.2F 7.68 fl oz/A (F) had the lowest percent of root galling followed by Temik 15G 5 lb/A (F), while treatments of Cruiser 600FS 0.34 mg a.i./seed (O) and Gaucho 600FS 6.39 fl oz/cwt (O) + Larvin 3.2F 3.84 fl oz/A (F) had the highest root galling. There were no differences in yield for treatments in trial one. In trial two, Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 14.04 fl oz/A, Gaucho 600 FS 6.39 fl oz/cwt (O) + Larvin 3.2F 7.68 fl oz/A (F), and Temik 15G 5 lb/A (F) improved yield significantly above treatments of Gaucho 600 FS 6.39 fl oz/cwt (O), Gaucho 500 FS 6.39 fl oz/cwt + Aeris 0.75 mg a.i./seed (O) and Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 7.02 fl oz/A (F). Nematode populations in trial one ranged up to 170 southern root-knot, 20 spiral, 10 lance, 50 ring, 90 stubby root and 10 dagger nematodes/500 cc soil, and trial two ranged up to 150 northern root-knot, 20 lesion, 210 stunt, 20 spiral, and 10 sting nematodes/500 cc soil.

Table 10. Comparison of cotton seed and in-furrow treatments for thrips and nematode (CotNema111 and 311)

Treatment and application method[z]	Plants/ft of row[y]	Thrips injury[x]	Plant height[w]	Root galling[v]	Lint yield (bales/A)[u]
Trial 1					
Gaucho 600FS 6.39 fl oz/cwt (O)	1.85	2.0 b	25.7 a	3.88 a-d	1.23
Cruiser 600FS 0.34 mg a.i./seed (O)	2.21	2.5 ab	24.0 c	4.31 a	1.06
Gaucho 600FS 6.39 fl oz/cwt + Aeris 0.75 mg a.i./seed (O)	1.70	2.3 ab	24.7 bc	3.63 b-d	1.15
Cruiser 600FS 0.34 mg a.i./seed + Avicta 500FS 0.15 mg a.i./seed (O)	1.82	2.5 ab	24.9 ab	4.19 ab	1.08
Gaucho 600FS 6.39 fl oz/cwt(O) + Larvin 3.2F 1.92 fl oz (F)	1.86	2.3 ab	24.3 bc	3.94 a-c	1.28
Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 3.51 fl oz (F)	1.85	2.3 ab	24.6 bc	3.75 a-d	1.21
Gaucho 600FS 6.39 fl oz/cwt (O) + Larvin 3.2F 3.84 fl oz (F)	1.98	2.3 ab	24.5 bc	4.31 a	1.03
Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 7.02 fl oz (F)	1.93	2.8 a	24.3 bc	4.19 ab	1.18
Gaucho 600FS 6.39 fl oz/cwt (O) + Larvin 3.2F 7.68 fl oz (F)	1.87	2.5 ab	24.5 bc	3.25 d	1.27
Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 14.04 fl oz (F)	1.88	2.5 ab	24.2 bc	4.19 ab	1.23
Temik 15G 5 lb/A (F)	2.00	1.0 c	24.8 bc	3.31 cd	0.99
LSD	n.s.	0.7	0.1	0.7	n.s.
Trial 2					
Gaucho 600FS 6.39 fl oz/cwt (O)	1.84 b-d	1.5	25.2	-	1.24 cd
Cruiser 600FS 0.34 mg a.i./seed (O)	2.37 a	1.5	25.4	-	1.27 b-d
Gaucho 600FS 6.39 fl oz/cwt + Aeris 0.75 mg a.i./seed (O)	1.83 b-d	1.0	25.4	-	1.24 cd
Cruiser 600FS 0.34 mg a.i./seed + Avicta 500FS 0.15 mg a.i./seed (O)	1.73 d	1.0	25.5	-	1.43 a-c
Gaucho 600FS 6.39 fl oz/cwt(O) + Larvin 3.2F 1.92 fl oz (F)	1.82 cd	1.3	25.6	-	1.46 a-c
Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 3.51 fl oz (F)	1.81 cd	1.3	25.9	-	1.34 a-d
Gaucho 600FS 6.39 fl oz/cwt (O) + Larvin 3.2F 3.84 fl oz (F)	2.06 b	1.0	25.4	-	1.52 a-c
Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 7.02 fl oz (F)	1.97 bc	1.3	25.8	-	1.11 d
Gaucho 600FS 6.39 fl oz/cwt (O) + Larvin 3.2F 7.68 fl oz (F)	1.89 b-d	1.0	25.3	-	1.53 ab
Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 14.04 fl oz (F)	1.91 b-d	1.5	24.3	-	1.63 a
Temik 15G 5 lb/A (F)	1.81 cd	1.0	25.6	-	1.53 ab
LSD	0.2	n.s.	n.s.		0.28

[z] O=overcoat on top of base fungicide treatment, F=in furrow at planting.
[y] Determined from counts of two, 30-ft rows per plot on 10 Jun.
[x] Thrips damage rating scale: 0=no damage, 10=severe damage. Ratings taken on 14 Jun and 12 Jun, trials one and two, respectively.
[w] Mean of three plants in each row/plot on 7 Jul.
[v] Roots of two plants in each row/plot were scored according to the percent of roots with galls: 0=none, 1=1-10%, 2=11-25%, 3=26-50%, 4=51-75%, 5=76-90%, 6=91-100% on 22 Sep in trial one only. No galling was found in Trial two.
[u] Lint was 40.1 and 39.8% of seed cotton weight in trials one and two, respectively; one bale of lint = 480 lb.
Means followed by the same letter(s) in a column and trial are not significantly different according to Fisher's Protected LSD (P=0.05), except $P \leq 0.10$ was used for mean separation in plant height for trial one (P=0.0916) and lint yield in trial 2 (P=0.0977).

Evaluation of Counter 20G for thrips and nematode control in cotton (Morgan farm and Tidewater Research farm, Suffolk, VA). Two field trials evaluated the efficacy of Counter 20G in-furrow for control of nematodes and thrips. Soil was Rumford loamy fine sand and Kenansville loamy sand in trials one and two, respectively. The field trials were prepared for planting by ripping and strip-tilling rows into cotton stubble in trial one and wheat cover crop in trial two. All seed were treated with a base treatment of Apron XL 0.32 oz + Maxim 0.08 oz + NuFlow M 1.75 oz + Nusan 30 1.25 oz + Lorsban 0.10 oz/cwt in trial one and Dynasty CST + Cruiser in trial two. The treatment with Avicta Duo was applied as an overcoat treatment (O) on the base treated seed. Treatments were two, 30-ft rows spaced 36 in. apart in four randomized complete blocks and planted at 3 seed/ft of row. The treatments with Temik 15G (F) and Counter 20 G (F) were applied to the seed furrow at planting on 13 May and 12 May in trials one and two, respectively. A foliar spray of Orthene 97S at 6 oz/A and 8 oz/A was applied to all plots on 26 May in trials one and two, respectively. Additional Orthene 97S at 8 oz/A was applied on 14 Jun for thrips control and Baythroid XL at 4 fl oz/A was applied on 15 Aug for bollworm control in trial one. Brigade 4 fl oz/A was applied on 19 Jul and Baythroid XL 3 fl oz/A on 30 Jul and 10 Aug for bollworm control in trial two. Standard practices were followed for managing soil fertility, cotton growth, and weed control. Soil samples for determining nematode populations were collected on 26 Jul in trial 1 and 25 Jul in trial 2. All plots were harvested with a two-row spindle picker on 27 and 10 Oct in trials one and two, respectively.

Stand counts averaged from 1.85 to 2.24 and from 2.22 to 2.86 plants/ft of row in trials one and two, respectively (Table 11). In both trials, Avicta Duo (O) had the lowest stand count but in trial two it was not significantly lower than the untreated check or Temik 15G 7 lb/A (F). All treatments, except Avicta Duo (O), reduced thrips injury below the untreated check in trial one. Temik 15G at 3.5 and 7 lb/A had the lowest thrips injury in both trials followed by Counter 20G at 5.25 and 6.5 lb/A. There was no effect of treatment on plant height in trial one. In trial two, Counter 20G at 4 and 5.25 lb/A (F) and Temik 15G 3.5 lb/A (F) increased plant height over the untreated control. The number of flowers on 13 Jul in trial one were reduced by all Counter 20G treatments, but there were no differences in trial two. Southern root-knot root galling was detected in trial one. Counter 20G at 5.25 and 6.5 lb/A (F) and Temik 15G at 3.5 and 7 lb/A reduced galling significantly below the untreated control. There was no treatment effect on yield in trial one. In trial two, Counter 20G at 5.25 lb/A significantly increased yield over Counter 20G 4 lb/A, the untreated check and Avicta Duo (O). Counter 20G at 6.5 lb/A and Temik 15G at 3.5 and 7 lb/A also increased yield significantly above the yield of Avicta Duo (O). Nematode counts of southern root-knot ranged up to 50 southern root-knot, 40 spiral, and 10 common lance nematodes/500 cc soil at trial one; counts at trial two ranged up to 30 northern root-knot, 90 ring, and 20 stubby root nematodes/500 cc soil.

Table 11 . Evaluation of Counter 20G for nematode and thrips control in cotton (CotNema211 and 411)

Treatment and application method[z]	Plants/ft of row[y]	Thrips injury[x]	Plant height (in.)[w]	Flowers/ 12 ft of row[v]	Root galling[u] (0-6)	Lint yield (bales/A)[t]
Trial 1						
Untreated check	2.15 a	3.0 a	25.2	14.5 a	2.0 a	0.82
Counter 20G 4 lb/A (F)	2.09 a	2.3 bc	25.3	9.0 c	1.4 a-c	0.70
Counter 20G 5.25 lb/A (F)	2.23 a	1.8 cd	24.3	9.5 bc	1.0 bc	0.54
Counter 20G 6.5 lb/A (F)	2.22 a	1.8 cd	24.5	9.0 c	0.9 c	0.67
Temik 15G 3.5 lb/A (F)	2.24 a	1.5 d	25.0	12.8 a-c	0.1 d	0.56
Temik 15G 7 lb/A (F)	2.12 a	1.5 d	25.1	16.3 a	0.8 cd	0.87
Avicta Duo (O)	1.85 b	2.5 ab	24.9	14.0 ab	1.7 ab	0.70
LSD	*0.24*	*0.5*	*n.s.*	*4.6*	*0.7*	*n.s.*
Trial 2						
Untreated check	2.36 bc	3.5 a	24.3 c	17.3	-	1.15 bc
Counter 20G 4 lb/A (F)	2.84 a	1.0 bc	25.6 ab	16.5	-	1.15 bc
Counter 20G 5.25 lb/A (F)	2.73 a	1.0 bc	25.9 a	13.0	-	1.43 a
Counter 20G 6.5 lb/A (F)	2.86 a	0.8 c	24.7 bc	14.0	-	1.34 ab
Temik 15G 3.5 lb/A (F)	2.39 b	0.8 c	25.4 ab	14.5	-	1.24 ab
Temik 15G 7 lb/A (F)	2.36 bc	0.5 c	24.8 a-c	14.0	-	1.25 ab
Avicta Duo (O)	2.22 c	1.5 b	24.7 bc	20.8	-	1.02 c
LSD	*0.15*	*0.7*	*1.1*	*n.s.*	-	*0.21*

[z] F= in furrow at planting, O=overcoat on top of base fungicide treatment.

[y] Determined from counts of two, 30-ft rows per plot on 10 Jun and 9 Jun, trials one and two, respectively.

[x] Thrips damage rating scale: 0=no damage, 10=severe damage. Ratings taken on 13 Jun and 8 Jun, trials one and two, respectively.

[w] Mean of three plants in each row/plot on 7 Jul.

[v] Number of flowers in a 6-ft section in each row/plot on 13 Jul and 12 Jul, trials one and two, respectively.

[u] Rating scale: 0=none, 1=1-10%, 2=11-25%, 3=26-50%, 4=51-75%, 5=76-90%, 6=91-100% of root system with galls. Ratings were made on two randomly selected plants in each row/plot in trial one.

[t] Lint was 41.6 and 41.9% of seed cotton weight at trials one and two respectively; one bale of lint = 480 lb. Plots were harvested on 27 Oct and 10 Oct in trials one and two, respectively.

Means followed by the same letter(s) in a column and trial are not significantly different according to Fisher's Protected LSD (P=0.05).

Impact of Cotton Monoculture, Variety Selection, and Chemical Inputs on Disease Control, 2011

P. M. Phipps, D. E. P. Telenko, and J. D. Eisenback, Virginia Tech

TECHNICAL SUMMARY:

1. **Seedling disease and nematode losses in 2011.** Seedling diseases were estimated to reduce yield by 2%, valued at 1.7 million dollars in grower income. The estimated yield loss caused by nematodes was 4.0% with southern root-knot, stubby root, and sting nematodes accounting for the greatest loss. The estimated loss to all diseases totaled 6.1% of yield potential. This estimate amounted to a loss of 5.9 million pounds of lint or 5.5 million dollars in 2011.

2. **2011 growing season.** Periods of low rainfall (12 Jul to 26 Aug) and above-normal temperatures (10 to 29 Jul) caused moderate to severe crop stress and limited yield potential. Seasonal accumulations of degree days tracked above the 16-yr average throughout the growing season and accumulations of rainfall were close to normal until Hurricane Irene brought 13.7 in. of rainfall on 27 and 28 Aug (Fig 1). This category-1 hurricane produced winds ≥75 MPH that caused lodging and tangled yield-bearing limbs. As a result, harvest efficiency and yield were reduced. Cotton yield in Virginia was estimated to average 793 lb/A (1.65 bales/A) which was 73 lb below the 16-yr average for Suffolk.

3. **National cotton seed treatment trial (Tidewater Research Farm, Suffolk).** Seed of DP 0935 B2RF were planted on 14 April at a rate of 3 seed/ft of row. Soil temperature at the 4-in. depth was 61.4° F at planting and averaged 62.9° F up to 7 days after planting. Rainfall totaled 0.19 in. in the same period. Seedling disease was minimal at 4 wks after planting. Counts of healthy seedlings on 16 May and yield on 10 Oct were not improved significantly by seed treatments.

4. **Response of low vigor and high vigor seed to seed treatments.** Poncho Votivo applied to fungicide-treated seed suppressed stand counts, flower counts and yield to levels similar to untreated seed. Fungicide treatments on seed with or without in-furrow fungicide increased stand count, flower count, and yield of cotton. The addition of in-furrow fungicide (Quadris/Ridomil Gold) and/or a seed fungicide overcoat (Trilex Advanced) did not significantly improve the performance of the base fungicide treatment (Baytan/Vortex/Allegiance).

5. **Response of eight varieties to Temik 15G in-furrow for nematode control (Morgan Farm, Suffolk, VA).** Temik 15G 5 lb/A (F) increased stand count and reduced thrips injury in all varieties except ST 5288 B2RF. Plant height was increased significantly by Temik 15G 5 lb/A (F) in DP 1032 B2RF, ST 5458 B2RF, PHY 367 WRF, and AM 1550 B2RF. Flower counts on 13 Jul were significantly higher in PHY 367 WRF, ST 5288 B2RF, and PHY 375 WRF compared to DP 1028 B2RF, DG 2570 B2RF, ST 5458 B2RF, and AM 1550 B2RF. Temik 15G 5 lb/A (F) increased flowering significantly across all varieties. There were no significant main effects of variety or treatment on root-knot galling on 28 Sep. There were no differences in yield for varieties (P=0.3381) or treatment (P=0.9857).

6. **Response of three cotton varieties to seed treatments with and without foliar treatments compared to Temik 15G in-furrow (Morgan farm, Suffolk, VA).** Temik 15G (F) performed equal to or better than seed treatments with and without foliar treatments in reducing thrips injury, increasing plant height, and increasing flower count but differences were variable across varieties. Root galling was significantly different between varieties (highest in FM 1740 B2R, moderate in ST 5458 B2F, lowest in ST 4288 B2F), but not different across treatments. The effects of variety and treatment on yield were not significant.

7. **Comparison of cotton seed and in-furrow treatments for thrips and nematode control (Morgan farm and Tidewater Research farm, Suffolk, VA).** Temik 15G (F) significantly reduced thrips injury more than other treatments in trial one. Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 7.02 fl oz/A (F) had the highest thrips injury, which was significantly greater than Gaucho 600 FS 6.39 fl oz/cwt (O) or Temik 15G (F). Plant height was significantly different only in trial one and was highest with Gaucho alone. Root-knot nematode galling was detected only in trial one. Gaucho 600FS 6.39 fl oz/cwt (O) + Larvin 3.2F 7.68 fl oz/A (F) had the lowest percent of root galling followed by Temik 15G 5 lb/A (F), while treatments of Cruiser 600FS 0.34 mg a.i./seed (O) and Gaucho 600FS 6.39 fl oz/cwt (O) + Larvin 3.2F 3.84 fl oz/A (F) had the highest root galling. There were no differences in yield for treatments in trial one. In trial two, Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 14.04 fl oz/A, Gaucho 600 FS 6.39 fl oz/cwt (O) + Larvin 3.2F 7.68 fl oz/A (F), and Temik 15G 5 lb/A (F) improved yield significantly above treatments of Gaucho 600 FS 6.39 fl oz/cwt (O), Gaucho 500 FS 6.39 fl oz/cwt + Aeris 0.75 mg a.i./seed (O) and Cruiser 600FS 0.34 mg a.i./seed (O) + AgriMek 0.15 EC 7.02 fl oz/A (F).

8. **Evaluation of Counter 20G for thrips and nematode control in cotton (Morgan farm and Tidewater Research farm, Suffolk, VA).** Temik 15G at 3.5 and 7 lb/A in-furrow at planting had the lowest thrips injury in both trials followed by Counter 20G 6.5 lb/A. There was no effect of treatment on plant height in trial one, but Counter 20G at 4 and 5.25 lb/A (F) and Temik 15G 3.5 lb/A (F) increased plant height over the untreated control in trial two. Flower counts on 13 Jul in trial one were reduced by all Counter 20G treatments, but there were no differences in trial two. Southern root-knot nematode galling was detected in trial one. Counter 20G at 5.25 and 6.5 lb/A (F) and Temik 15G at 3.5 and 7 lb/A reduced galling significantly below the untreated control. There was no treatment effect on yield in trial one, but Counter 20G at 5.25 lb/A significantly increased yield over Counter 20G 4 lb/A, the untreated check and Avicta Duo (O) in trial two. Counter 20G at 6.5 lb/A and Temik 15G at 3.5 and 7 lb/A also increased yield significantly above the yield of Avicta Duo (O).