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PHY 440 W, PHY 470 WR AND PHY 480 WR: NEW UPLAND VARIETIES FROM PHYTOGEN WITH THE NEW WIDESTRIKE INSECT PROTECTION TECHNOLOGY FROM DOW AGROSCIENCES ALONE OR STACKED WITH ROUNDUP READY

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Abstract

In 2005, Phytogen Seed Company will offer cotton varieties with the new WideStrike™ insect protection trait from Dow AgroSciences. WideStrike™ is a new transgenic trait expressing both Cry1Ac and Cry1F toxins that control a broad spectrum of lepidopteran insects such as tobacco budworm, cotton bollworm, fall armyworm and loopers. PHY440W, PHY470WR and PHY480WR were developed by the backcross method using PSC355 as the recurrent parent. In regulated trials, PHY440W was the highest yielding variety tested and had significantly improved lint percent, micronaire and staple over its recurrent parent. There was no difference in the yield of PHY470WR and PHY480WR. However, there were differences in fiber quality as PHY470WR had a lower micronaire (equal to PHY440W) and PHY480WR had better staple, strength and uniformity. All three of these WideStrike varieties are early-mid maturity and broadly adapted across the Mid-South and Southeast.

Introduction

The Bollgard® trait from Monsanto has been the only insect protection trait available to cotton growers since its introduction in 1996. In 2004, Dow AgroSciences received approval from the USDA, FDA and EPA for sale of cotton varieties expressing both Cry1Ac and Cry1F transgenes which is commercially known as WideStrike™. Field efficacy studies have demonstrated excellent control of a broad spectrum of lepidopteran insects such as tobacco budworm, cotton bollworm, fall armyworm and loopers.

In 2000, Phytogen Seed Company entered the Southern cottonseed market with four in-licensed conventional varieties of which PSC355 was the most broadly adapted. Backcrossing of WideStrike™ and Roundup Ready® with PSC355 was conducted at the Dow AgroSciences greenhouse complex near Woodland, CA and field selections were made near Leland, MS.

Materials and Methods

The data were summarized from a database that included all available university and Phytogen small plot trials as well as strip trials conducted by Dow AgroSciences. Output from the Head-to-Head procedure of Agrobase 21 was converted to a “mean equivalent” basis for each trait to account for the unequal number of observations for each variety. The overall average percentage that each variety was of a control variety (where ever the two occurred together) was multiplied by the overall mean of that control variety. To minimize the effect of genotype by environment interaction, the mean equivalent for yield was independently estimated using both PHY440W and PHY470WR as control varieties. PHY470WR was the control variety for lint percent and fiber quality data. PHY440W was evaluated in 25 environments in 2003 and in 9 environments in 2004, while PHY470WR and PHY480WR were evaluated in 29 and 18 environments, respectively, in 2004.

Results and Discussion

Performance data from 2003 and 2004 (Table 1) indicated that PHY440W was higher yielding and had better fiber quality than its recurrent parent, PSC355. The higher yield of PHY440W (+111#) was apparently due to both a higher lint percent and to sub-threshold control of budworm and bollworm. With a lint percentage more similar to that of PSC355, the yield of both PHY470WR and PHY480WR were intermediate to that of PHY440W and

PSC355. All three WideStrike varieties were higher yielding than all of the conventional and Roundup Ready® varieties tested.

The fiber quality of PHY440W, PHY470WR and PHY480WR was very good. The staple of all three was better than ST4793R and SG521R. Apparently due to residual variability from the original Acala transformed line, the micronaire of PHY440W and PHY470WR (4.5) was lower than PSC355 and higher than only FM960R. With additional backcrossing away from the Acala parent, the micronaire of PHY480WR (4.7) was still less than ST4793R and PSC355. The fiber strength of PHY480WR was improved and less than only FM966. The strength of PHY470WR was better than SG521R.

Combined with the excellent insect control provided by the WideStrike™ trait, the demonstrated yield and fiber quality of PHY440W, PHY470WR and PHY480WR indicate that these varieties are good choices for growers that desire insect protection in varieties with or without herbicide tolerance.

Table 1. Performance of WideStrike varieties relative to commercial checks. *

	Lint Yield (#/acre)	Lint %	Seed Index (g/100)	HVI Staple (32's)	HVI Mic	HVI T1 (g/tex)	HVI UR (%)
PHY440W	***1320***	***42.3***	***10.7***	***36.9***	***4.5***	***30.7***	***85.4***
PHY470WR	***1249***	***41.3***	***10.6***	***36.5***	***4.5***	***29.8***	***85.4***
PHY480WR	***1226***	***41.1***	***10.2***	***37.1***	***4.7***	***31.3***	***85.7***
DP432R	1221	41.9	9.9	36.8	4.7	30.3	85.6
ST4793R	1221	42.9	11.4	35.6	4.8	30.1	85.0
PSC355	1198	41.0	10.2	36.3	4.8	30.9	85.6
FM966	1197	42.1	11.9	37.6	4.5	33.4	86.2
DP Pearl	1170	42.8	9.8	38.1	4.6	31.0	85.3
SG521R	1150	41.5	10.2	35.6	4.6	28.5	85.1
FM960R	1130	41.7	12.4	37.8	4.1	30.9	85.8
Average	1208	41.9	10.7	36.8	4.6	30.7	85.5

* Percent of control from head-to-head comparisons converted to "mean equivalent"