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PHY 800 PIMA: A NEW PIMA VARIETY FROM PHYTOGEN

Joel F. Mahill, David M. Anderson, John W. Pellow, Scott E. Bordelon and Christin N. Pace
Phytogen Seed Company, LLC
Corcoran, CA

Abstract

Phytogen Seed Co. LLC has introduced a new Pima variety that exhibits high yield potential in the San Joaquin Valley, CA. The primary objectives in developing PHY 800 Pima were to develop a Pima variety which would deliver consistently high yields while simultaneously improving on the current Pima fiber quality standard. PHY 800 Pima was has been tested throughout the San Joaquin Valley of California and has been shown to be widely adapted. Over four years of Advanced Strains Testing by Phytogen between 2001 to 2004, PHY 800 Pima yielded significantly more than PHY 76 Pima, the leading market share variety in 2003, by an average of 4.9%, or seventy four (74) pounds of lint per acre. PHY 800 Pima's fiber properties are superior to those of Pima S-7, the San Joaquin Valley Cotton Board (SJVCB) Pima variety standard. Furthermore, PHY 800 Pima has been shown to be resistant to the virulent race 4 of FOV (*Fusarium oxysporum vasinfectum*). As such, PHY 800 Pima is the only commercially available Pima variety in the San Joaquin Valley offering resistance to this pathogen.

Introduction

The Pima industry has experienced major advances in cotton production for lint yield in recent years. In the San Joaquin Valley of California, Pima fields exceeding three bales per acre in yield are common with four bale+ surfacing on occasion. Improved farming practices have certainly contributed to the recent high production. However, breeding and research efforts continue to produce and contribute improved cotton varieties. PHY 800 Pima is a new cotton variety developed for California's San Joaquin Valley by Phytogen Seed Company, LLC as a mid-maturity variety with outstanding yield potential and superior fiber quality. It has been widely tested in the San Joaquin Valley over a wide range of soil types ranging from sandy loam to heavy clay loams, and heat unit accumulations differing as much as 300 H.U. This paper presents results on measurements of yield, fiber quality, and resistance to *Fusarium oxysporum vasinfectum* for Phytogen Seed Company's new Pima variety, PHY 800 Pima.

Materials and Methods

PHY 800 Pima was developed by pedigree breeding and tested in preliminary strains tests between 1999 and 2000. Following analysis of yield and fiber, PHY 800 Pima was advanced into Phytogen's advanced strains testing program and widely tested throughout the SJV between 2001 and 2004. PHY 800 Pima was compared to Pima S-7, the San Joaquin Valley Cotton Board (SJVCB) standard Pima variety for fiber quality and PHY 76 Pima, a leading yield performance variety with major market share in 2003. Trials were randomized complete block designs with four replications. Yield and fiber quality data were determined from ginned sub-samples from 2 of the 4 plots at representative test locations. Fiber properties were evaluated on high volume instrumentation (HVI), individual instruments, and arealometer at either ITC or Starlab.

Screening trials planted in infested fields in 2003, conducted by the University of CA Cooperative Extension, indicated PHY 800 Pima to be resistant to the virulent race 4 of FOV (*Fusarium oxysporum vasinfectum*). Expanded screening trials were conducted in 2004 by the University of CA Cooperative Extension scientists to evaluate cotton lines at two farm sites confirmed to have race 4 of FOV. Symptom rating data was gathered July 21-23, 2004, described herein as foliar damage index and root vascular stain index ratings. The rating scale for both symptoms was 1=no symptoms evident to 5=severe or extensive symptoms.

Results and Discussion

Phytogen Pima Advanced Strains Test (AST) results are shown in Figure 1 (2001 – 2004), by year and over years, representing 19 test locations in the San Joaquin Valley of California. PHY 800 Pima yields were significantly higher than those of Pima S-7 in all test locations. PHY 800 Pima yields were significantly higher than PHY 76

Pima in 2003 and 2004. Over four years of testing, PHY 800 Pima yields were significantly higher than PHY 76 Pima with a yield advantage of 4.9%.

It is relevant to examine the wide range of adaptation in yield performance of PHY 800 Pima in the most recent performance years of 2003 and 2004. Phytogen Pima Advanced Strains Tests are shown in Figure 2 (2003) and Figure 3 (2004), by test locations for each year.
PHY 800 Pima yields were higher than PHY 76 Pima in 9 of 11 test locations over 2003 and 2004. Over locations of testing within each year, PHY 800 Pima yields were significantly higher than those of PHY 76 Pima with yield advantages in 2003 and 2004 of 4.4% and 7.1%, respectively.

Fiber quality results determined by HVI measurement are shown in Table 1. PHY 800 Pima exhibited excellent fiber qualities as exemplified by significantly improved in fiber length, strength, elongation, and a finer fiber micronaire as compared to Pima S-7, the SJVCB quality standard. Fiber color components Rd and Plus b for PHY 800 Pima were non-significantly different from Pima S-7, demonstrating an equally bright fiber.

Fiber quality results by individual instruments are shown in Table 2. Similar to HVI fiber quality results, PHY 800 Pima exhibited fiber qualities significantly improved in 2.5% span length, elongation, and finer micronaire as compared to Pima S-7. Fiber quality data obtained by Arealometer instrument measurements are shown in Table 3. Inherent components of fiber micronaire are shown to support the improved micronaire of PHY 800 Pima. PHY 800 Pima exhibited a significantly improved weight fineness compared to Pima S-7, while fiber perimeter exhibited a trend of improvement as exhibited by its smaller perimeter.

PHY 800 Pima was first observed to be resistant to race 4 of FOV during the 2003 growing season. Resistance of PHY 800 Pima to the virulent race 4 of FOV was evaluated in more extensive trials in 2004. The data are shown in Table 4. PHY 800 Pima exhibited high resistance to race 4 of FOV in comparison to the cotton variety DP744. DP744 is considered to be a highly susceptible variety and is therefore useful in this comparison. PHY 800 Pima demonstrated foliar damage index ratings at ~0.1 vs. 3.8 of the comparison variety. PHY 800 Pima demonstrated root vascular stain index ratings at ~0.1 vs. -4.7 for DP 744, which is consistent with the foliar damage ratings.

Summary

In Phytogen Pima Advanced Strains trials, conducted over four years (2001 – 2004), PHY 800 Pima has shown a significant yield advantage over PHY 76 Pima and has exhibited wide adaptation in yield performance in the San Joaquin Valley of California. PHY 800 Pima is a mid-maturity Pima variety developed to capture the full season yield potential of the SJV growing region. It has high quality fiber significantly improved over the San Joaquin Valley Pima quality standard Pima S-7. The improved fiber length, excellent uniformity of length, high fiber strength, better elongation, and smaller fiber perimeter will all combine to enhance spinning performance. The demonstrated high resistance of PHY 800 Pima to the virulent race 4 of FOV (*Fusarium oxysporum vasinfectum*) makes PHY 800 Pima the only commercially available Pima variety with resistance to this pathogen. PHY 800 Pima represents a significant advancement for Pima growers with its high yield, excellent fiber quality and Fusarium resistance.

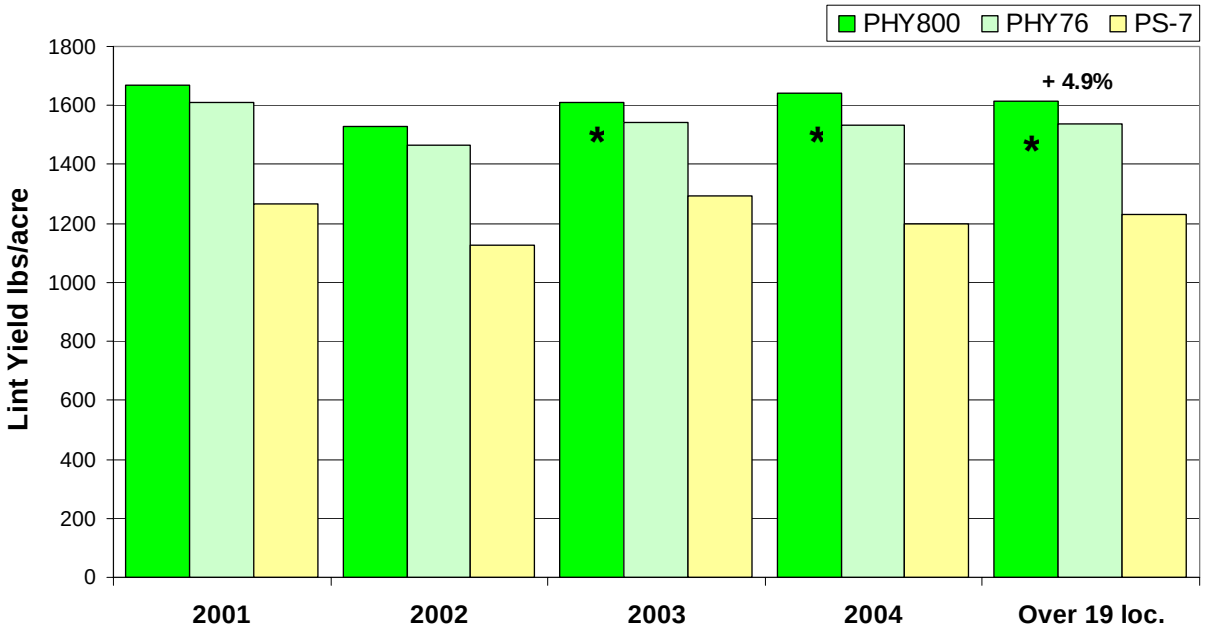

Figure 1. Phytogen Pima Advanced Strains Trials, 2001 – 2004.

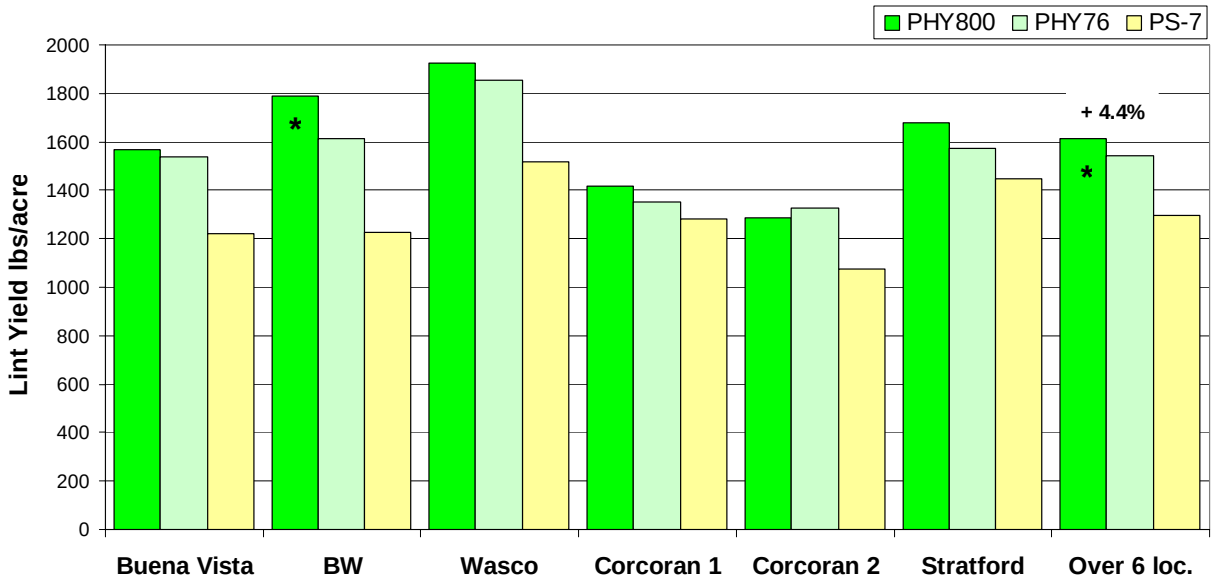

Figure 2. Phytogen Pima Advanced Strains Trials, 2003.

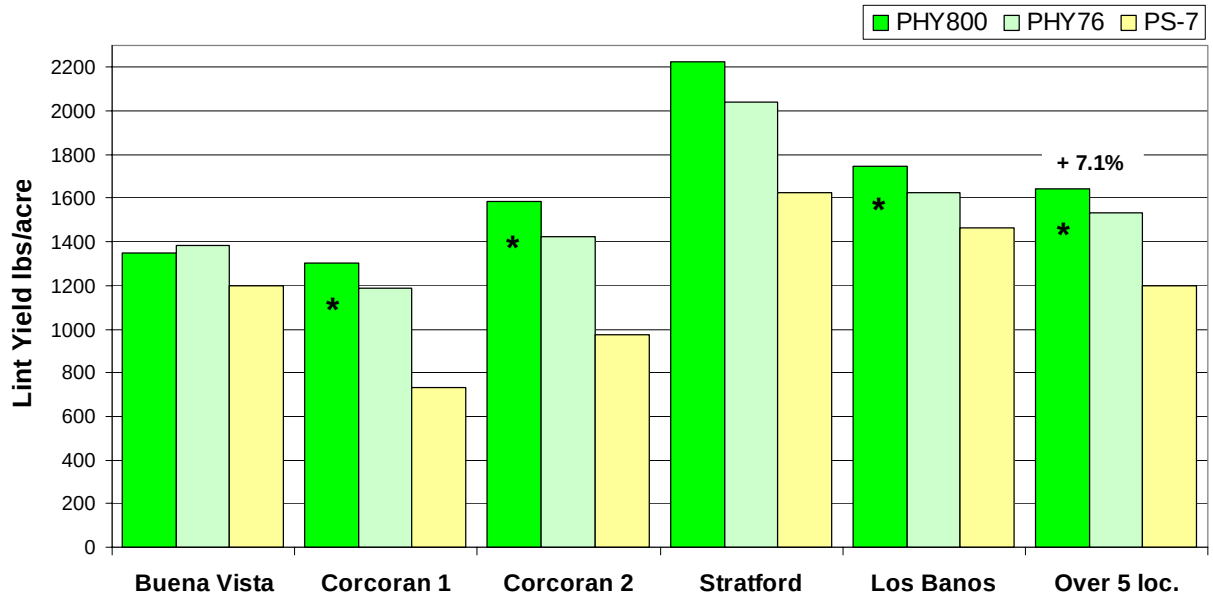

Figure 3. Phytogen Pima Advanced Strains Trials, 2004.

Table 1. Fiber Quality Traits (HVI, 16 Locations, 2000-2003).

		PHY 800	PHY 76	Pima S-7
Length		1.42 *	1.39	1.40
Uniformity		88.7	88.5	88.4
Strength T1 (g/tex)		43.1 *	43.0	42.4
Elongation		6.0 *	7.4 *	5.3
Micronaire		4.03 *	4.35	4.30
Rd		69.6	65.5 *	68.8
Plus b	(-)	11.3	12.7 *	11.4

* Indicates a significant LSD value at alpha = .05.
(-) Lower value indicates an improvement.

Table 2. Fiber Quality Traits (Individual Instruments, 13 Locations, 2000-2003).

	PHY 800	PHY 76	Pima S-7
2.5% Span Length	1.45 *	1.41	1.42
Uniformity Ratio	50.2	51.6 *	50.3
Strength T1 (g/tex)	33.6	33.8	33.6
Elongation	7.8 *	8.6 *	7.5
Micronaire	4.06 *	4.40	4.30

* Indicates a significant LSD value at alpha = .05.

Table 3. Arealometer Instrument Fiber Traits, 4 Locations).

		PHY 800	PHY 76	Pima S-7
Weight Fineness	(-)	3.12 *	3.39	3.49
Perimeter (microns)	(-)	40.9	41.2	42.4
Maturity %		87.2	91.0	89.6

* Indicates a significant LSD value at alpha = .05.
(-) Lower value indicates an improvement.

Table 4. Foliar Damage Index and Root Vascular Stain Index ratings of race 4 FOV (*Fusarium oxysporum* vasinfectum) symptoms for PHY 800 Pima, (UCCE 2004 Field Trials).

Index	PHY 800	DP744
Foliar Damage index		
Location 1	~0.1	3.1
Location 2	~0.1	3.8
Root Vascular Stain index		
Location 1	~0.1	4.7
Location 2	~0.1	4.0