



Height, Yield and Oil Content of Short-Stature Sunflower (*Helianthus annuus*) vs. Conventional Height Sunflower in Texas



Calvin L. Trostle¹, Dennis Pietsch², Sean Wallace¹
¹Texas A&M AgriLife Extension Service, Lubbock, TX 79403,
 (806) 746-6101, ctrostle@ag.tamu.edu, smwallace@ag.tamu.edu
²Crop Testing Program, Texas A&M AgriLife Research, College Station TX 77843
 (979) 845-8505, dpietsch@ag.tamu.edu



ABSTRACT

Beginning in 2003 sunflower producers could consider planting oilseed sunflower hybrids which are up to 1 m (or 50%) shorter than conventional height sunflower. This enables producers to manage their crop with their own ground rigs for spraying, cultivating, etc. Comparing short-stature sunflower vs. conventional height hybrids, the objectives are 1) document height differentials between hybrids, 2) compare yields, 3) compare oil content, and 4) calculate crop value. The Texas A&M AgriLife Research Crop Testing Program routinely plants numerous short-stature hybrids that are submitted for conventional height hybrid testing in the performance tests. Trial sites include the Texas High Plains (2005-2011) and Central Texas/Coastal Bend (2009-2011) where usually three or more short-stature entries are grown. Many initial short-stature hybrids were near 1 m tall, but some hybrids now labeled short-stature are in fact almost as tall as conventional hybrids, and cannot be farmed with in-field equipment. Texas High Plains tests in 2008-2011 found no substantial difference in yield (SS = 2,555 kg/ha vs. CH = 2,467 kg/ha), oil content (SS= 43.1%, all others 41.1%), and crop value (SS = \$1,271/ha vs. CH = \$1,194/ha). Results suggest there is no performance drag associated with short-stature oilseed sunflower. Coupled with the convenience of spraying oilseed sunflower with a ground rig rather than an airplane, short-stature sunflower is a suitable alternative to conventional height sunflower.

WHAT IS SHORT-STATURE SUNFLOWER?

Short-stature (SS) sunflower, initially released in 2003, was as much as 1 m shorter than conventional height (CH) sunflower depending on growing conditions (Fig. 1). Yield potential readily topped 2,000 kg/ha. The compact growth habit of SS sunflower has shorter internodes between leaf axils while maintaining the same number of leaves. Though this leads to greater shading of lower leaves, producers have greater field management operations such as mechanical cultivation and spraying for key insects, especially sunflower (head) moth, *Homoeosoma electellum* (Hulst). Ground spraying with higher carrier volume per hectare is often favorable compared to aerial spraying, which also sometimes experiences untimely scheduling delays. The compact SS growth is evident within four weeks after emergence. More recently some sunflower hybrids marketed as SS are only ~0.3 m shorter than CH, and these "tall" SS hybrids may not permit the added field management options (Fig. 2).



Figure 1. Short-stature sunflower (hyb. Triumph s672) at 0.97 m tall vs. several conventional height hybrids 1.40-1.65 m tall (row spacing is 1.01 m; 2008, Lubbock, TX).

OBJECTIVES

Does short short-stature sunflower offer comparable yields and profitability vs. conventional height sunflower? Our hypothesis is that SS sunflower does. Using recent Texas A&M AgriLife field trials where SS and conventional hybrids were tested, the objectives are:

- 1) Report average, minimum, and maximum heights
- 2) Compare yields
- 3) Compare oil content
- 4) Evaluate crop value.



Figure 2. Short-stature sunflower (hyb. Triumph s870CL) at 1.30 m tall vs. conventional height hybrids 1.63-1.91 m tall (row spacing is 1.01 m; 2010, Lubbock, TX). This short-stature hybrid is sufficiently tall such that producers may lose the ability to run field equipment for cultivation, spraying, etc.

HOW THIS ASSESSMENT WAS CONDUCTED

The Texas A&M AgriLife Research Crop Testing Program has conducted fee-based hybrid testing for private companies since 2008 (<http://varietytesting.tamu.edu/sunflower>) in the Texas High Plains, and since 2010 in central and coastal Texas.

The comparison of yield, oil content, and crop value is non-statistical. Rather agronomists, crop consultants, and producers are primarily interested in comparable yields, which also provides documentation of whether SS sunflower—as a group of hybrids—yields competitively vs. conventional hybrids, data which will combat misinformation used in marketing and promotion of seed sales.

Hybrid trial results for SS hybrids, as labeled by the marketing company, were separated from conventional height hybrids for Texas sites at Lubbock (2008-2011), Etter (2008-2011), central Texas (2010-2011) and Corpus Christi (2010-2011).

RESULTS

For the Texas High Plains 15% of entered hybrids (32 of 208) across four years a 2 locations were SS hybrids (Tables 1 & 2), and 20% of coastal/central Texas oilseed entries were SS (Table 3).

Table 1. Annual and cumulative summary of height, including minimum and maximum height, oil content, yield, and crop value of short-stature vs. conventional height sunflower, Etter, TX, 2008-2011.

Year & Height	# of Hybrids	Average Height (m)	Minimum Height (m)	Maximum Height (m)	Oil Content (%)	Yield (kg/ha)	Crop Value (\$/ha)
2008 Short	5	1.15	0.97	1.30	40.4	2,568	\$1,394
2008 Conv	21	1.53	1.19	1.80	37.8	2,367	\$1,218
2009 Short	5	1.33	1.24	1.50	47.1	2,964	\$1,358
2009 Conv	28	1.86	1.57	2.29	44.8	2,923	\$1,293
2010 Short	4	1.40	1.30	1.50	43.1	2,696	\$994
2010 Conv	22	1.80	1.60	1.96	40.7	2,817	\$975
2011 Short	3	1.06	1.04	1.12	41.2	2,429	\$1,534
2011 Conv	25	1.41	1.22	1.68	41.3	2,506	\$1,587
4-Yr Short	17	1.23	1.14	1.35	42.9	2,665	\$1,320
4-Yr Conv	96	1.65	1.40	1.93	41.1	2,653	\$1,268

Table 2. Annual and cumulative summary of height, including minimum and maximum height, oil content, yield, and crop value of short-stature vs. conventional height sunflower, Lubbock TX, 2008-2011.

Year & Height	# of Hybrids	Average Height (m)	Minimum Height (m)	Maximum Height (m)	Oil Content (%)	Yield (kg/ha)	Crop Value (\$/ha)
2008 Short	2	1.28	1.12	1.45	41.3	2,966	\$1,611
2008 Conv	17	1.62	1.37	1.80	41.2	3,068	\$1,674
2009 Short	4	1.09	0.99	1.32	46.6	1,789	\$815
2009 Conv	24	1.53	1.24	1.80	41.7	1,367	\$570
2010 Short	4	1.41	1.37	1.45	42.0	2,810	\$1,008
2010 Conv	18	1.62	1.37	1.88	40.3	2,473	\$846
2011 Short	5	0.98	0.97	0.99	43.0	2,219	\$1,452
2011 Conv	21	1.33	1.14	1.55	40.8	2,215	\$1,391
4-Yr Short	15	1.19	1.11	1.30	43.2	2,446	\$1,221
4-Yr Conv	80	1.53	1.28	1.76	41.0	2,281	\$1,120

Table 3. Annual summary of height, including minimum and maximum height, oil content, yield, and crop value of short-stature vs. conventional height sunflower, in coastal Texas (Corpus Christi) and central Texas (Bardwell), 2010-2011.

Year & Height	# of Hybrids	Average Height (m)	Minimum Height (m)	Maximum Height (m)	Oil Content (%)	Yield (kg/ha)	Crop Value (\$/ha)
Corpus 2010 Short	3	0.95	0.86	1.07	45.3	2,032	\$713
2010 Conv	7	1.30	1.14	1.43	41.7	1,592	\$514
Corpus 2011 Short	2	0.90	0.86	0.94	45.9	1,691	\$1,187
2011 Conv	9	1.22	1.12	1.35	43.3	1,775	\$1,203
Bardwell 2010 Short	2	1.41	1.40	1.42	44.0	1,410	\$565
2010 Conv	11	1.84	1.70	2.01	41.8	1,700	\$661
Bardwell 2011 Short	2	0.90	0.86	0.94	45.9	1,691	\$1,187
2011 Conv	9	1.22	1.14	1.35	43.8	1,775	\$1,203

DISCUSSION

Short-stature sunflowers are not expected to outperform CH hybrids, rather if they are comparable in yield and ultimately crop value per hectare producers will take advantage of the management opportunities they present. Short hybrids as a group yielded essentially the same at Etter and 160 kg/ha more at Lubbock. When combined with ~2% higher oil content in SS then crop value was \$52 to 100/ha higher over four years. This does not represent additional cost savings due to management since the producer can conduct additional field operations himself.

Similar results have been observed to date in central and coastal Texas although the total number of SS hybrids as a class is less. In all cases SS hybrids had higher oil content than CH hybrids. This is not so much a function of the SS hybrids themselves rather the hybrid seed company marketing SS sunflowers, Triumph Seed, Ralls, TX, has generally higher oil content in their CH hybrids as well.

Although plant height for both SS and CH hybrids is a function of environment, applied nitrogen (N) fertility and rainfall + irrigation, recent trend to SS hybrids that are 0.2-0.3 m taller than SS hybrids released several years ago may diminish the attraction of planting SS hybrids. Hybrids that exceed 1.1 m may lose their advantage in ease of field operations like cultivation and field spraying.

DISCLAIMER

This report is not an endorsement of any product or company by Texas A&M AgriLife Extension Service.