The CT NASS US Cotton Squaring Pace Signal: Phenology Overlay for Cotton

Why USDA NASS weekly US cotton squaring progress year-over-year delivers a strongly significant one-sided bearish warning on Cotton forward 60-day returns across 26 years.

David Stendahl · Market Lab Analytics · November 6, 2026

The signal with the limits stated upfront

Three things the reader must know before the rest of this brief lands.

First, the full-distribution daily Spearman information coefficient against Cotton forward 60-day returns is minus 0.071 at p-value 8.2e-9 on a sample of 6,569 daily observations spanning 2000 through 2026. Strongly significant on the 26-year window.

Second, the phase pattern is highly non-monotone. Phase +1 (Ahead of Pace) delivers minus 3.05 percentage points below baseline across 1,209 trading days (18.4 percent of sample); Phase 0 (On Trend) delivers plus 0.76 percentage points above baseline on a majority 72.6 percent share; Phase –1 (Behind Pace) delivers plus 0.10 percentage points near baseline on 9.0 percent share.

Third, the non-overlap independence test at 60-day sampling is not independently significant. Across 110 independent samples the Spearman is plus 0.009 with p-value 0.92. The signal functions as a one-sided ahead-of-pace bearish warning rather than a symmetric directional overlay.

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The thesis: phenology timing as a yield-preview signal

USDA NASS Crop Progress reports publish weekly estimates of US cotton squaring percent complete during the June through August yield-determination window. Squaring is the growth phase when cotton plants develop flower buds; it precedes flowering, boll set, and boll development. The pace at which squaring progresses relative to the trend-year reveals whether the US crop is tracking stressed (behind pace), normal (on pace), or accelerated (ahead of pace).

Ahead-of-pace years typically reflect favorable early-season weather — warm temperatures, adequate moisture, and clear-day growing conditions. The early squaring preview often predicts strong yields that pressure Cotton futures by harvest time. Behind-pace years reflect stress but the subsequent price response is noisy because the stress can resolve, intensify, or shift to other growth phases.

The signal takes USDA NASS US cotton squaring percent complete year-over-year percent change, z-scores on a rolling window, and tanh-bounds. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3, phase –1 below –0.3. Target: ICE US Cotton No. 2 first-nearby back-adjusted close.

Historical window: USDA NASS Crop Progress cotton squaring series from 2000; engine runs from 2000 onward with 504-bar warmup.

What the firings have actually done

Computed over 6,569 daily observations post-warmup from 2000 onward. The baseline Cotton forward 60-day return is mean plus 0.97 percent and median plus 0.15 percent across the live-window sample.

> **Baseline Cotton forward 60-day return:** mean plus 0.97 percent / median plus 0.15 percent across the live-window sample.
>
> **Daily Spearman IC (fwd 60d):** minus 0.071, p-value 8.2e-9, N equals 6,569. Strongly significant.
>
> **Non-overlap IC (60-day step):** plus 0.009, p-value 0.92, N equals 110. Not independently significant.
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> **Phase-conditional forward 60-day Cotton returns:** Phase +1 (Ahead of Pace, 1,209 days / 18.4 pct): minus 2.08 percent, edge minus 3.05 pp. Phase 0 (On Trend, 4,770 days / 72.6 pct): plus 1.73 percent, edge plus 0.76 pp. Phase –1 (Behind Pace, 590 days / 9.0 pct): plus 1.07 percent, edge plus 0.10 pp.
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> Highly non-monotone pattern; directional edge concentrated in Phase +1 extreme bearish tail.

Three findings. The daily IC is strongly significant on the 26-year window with clear bearish polarity. The directional edge concentrates sharply in the Phase +1 Ahead of Pace tail at minus 3.05 pp; Phase 0 and Phase –1 are both near-baseline or mildly bullish. The signal functions as a one-sided ahead-of-pace bearish warning rather than a symmetric overlay.

Three cases that frame how to read the signal

The canonical anchors are the 2018 squaring acceleration, the 2010 fast squaring year, and the 2022 Texas megadrought delay.

Case 1: The 2018 squaring acceleration

Ahead of Pace firing through mid-2018 as US cotton squaring tracked ahead of trend on favorable early-season weather across the cotton belt. Composite held in Phase +1 territory through the growing window. Cotton underperformed through late 2018 and into 2019 cycle-low pricing consistent with the Phase +1 bearish edge; the accelerated pace previewed the strong 2018 crop that pressured futures.

Case 2: The 2010 fast squaring year

Ahead of Pace firing in mid-2010 as US cotton squaring tracked materially ahead of trend on strong early-season moisture across the belt. Composite held in Phase +1 territory through the squaring

window. Cotton returns through late 2010 compressed consistent with the Phase +1 edge despite the broader 2010-11 commodity supercycle backdrop; the pace signal correctly previewed strong US yields even in a bullish macro regime.

Case 3: The 2022 Texas megadrought delay

Behind Pace firing in mid-2022 as the Texas megadrought delayed US cotton squaring progress materially. Composite held in Phase −1 territory through the stressed growing window. Cotton rallied materially through 2022 but the signal edge at Phase −1 is near-baseline; the fundamental drought signal (US Cotton Belt DSCI, USDA PSD production collapse) dominated the pace-timing signal. The 2022 episode illustrates that Phase −1 near-baseline edge is real — the pace delay was overwhelmed by the broader drought regime driving the rally.

How to use this signal today

Composite is currently reading plus 0.205 in the Ahead of Pace band. The Neutral phase began October 2026, 39 trading days ago. USDA NASS US cotton squaring progress has run modestly ahead of trend pace through the 2026 growing season.

Pair with the following for stacked conviction: US Cotton Belt DSCI (short-lead weather), USDA PSD US production (systemic supply anchor), India Vidarbha and Gujarat GRACE (India supply), Xinjiang CHIRPS (China supply), Pakistan Punjab CHIRPS, Baltic freight (global demand), apparel inventory, CFTC positioning. This NASS phenology signal gives the US growing-cycle preview; pair with weather and systemic supply for the full US read.

Reader rule: Ahead of Pace firings flag bearish regimes where strong US crop development previews supply strength. Behind Pace firings flag near-baseline regimes; the directional information concentrates in the Phase +1 extreme.

Methodology

Data source: USDA NASS weekly Crop Progress report, US cotton squaring percent complete series. Computation: year-over-year percent change in squaring progress, z-scored on a rolling window, tanh-bounded. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3, phase −1 below −0.3. Target: ICE US Cotton No. 2 first-nearby back-adjusted close.

Historical window: USDA NASS Crop Progress cotton squaring series from 2000; engine runs from 2000 onward with a 504-bar warmup for the rolling z-score. NASS releases Crop Progress Monday afternoon during the June-October growing season.

Validation computed on 6,569 post-warmup daily observations. Daily Spearman IC minus 0.071 at p-value 8.2e-9 across 6,569 observations, strongly significant on 26-year sample. Phase +1 per-day forward return minus 2.08 percent (minus 3.05 pp below plus 0.97 percent baseline). Phase 0 per-day forward return plus 1.73 percent (plus 0.76 pp above baseline). Phase −1 per-day forward return plus 1.07 percent (plus 0.10 pp near baseline). Non-overlap IC at 60-day sampling plus 0.009 at p-value 0.92 across 110 samples, not independently significant.

What this signal does not cover

The signal does not cover other NASS growth-progress categories (planted, emerged, boll set, defoliated). It does not capture subjective NASS good/excellent crop condition ratings. It does not cover state-level phenology variation (Texas vs Georgia vs Mississippi have different timing). It does not capture non-US cotton phenology. NASS weekly cadence limits sub-weekly resolution.

Disclaimer

This brief and the signal it describes are for informational purposes only and do not constitute investment, legal, tax, or trading advice. Hypothetical or simulated performance results have certain inherent limitations. Unlike an actual performance record, simulated results do not represent actual trading. Also, since the trades have not been executed, the results may have under- or over-compensated for the impact, if any, of certain market factors, such as lack of liquidity. Simulated trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. The phase-conditional forward-return stats reported above are a full-sample unconditional measurement. Readers should consult a licensed financial professional before taking any trading action.

References

USDA National Agricultural Statistics Service, Weekly Crop Progress report, nass.usda.gov.

ICE Futures US, Cotton No. 2 first-nearby back-adjusted continuous contract (ticker CT), end-of-day settlement.