The CT NASS Pct Setting Bolls Z Signal: Phenology Overlay for Cotton

Why USDA NASS weekly US cotton setting bolls pace delivers a non-monotone 26-year directional pattern on Cotton forward 60-day returns concentrated in the Phase 0 On-Trend middle regime.

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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 0.009 at p-value 0.47 on a sample of 6,676 daily observations spanning 2000 through 2026. Not individually significant on the daily sampling test.

Second, the phase pattern is strongly non-monotone. Phase +1 (Delayed Pace) delivers plus 3.38 percent fwd60d across 938 trading days (14.1 percent of sample); Phase 0 (On-Trend Pace) delivers minus 24.65 percent on 29.4 percent share; Phase −1 (Early Pace) delivers plus 3.26 percent across 3,777 days (56.6 percent). The directional information concentrates in the Phase 0 middle regime rather than the extremes.

Third, the non-overlap independence test at 60-day sampling is also not independently significant. Across 112 independent samples the Spearman is plus 0.003 with p-value 0.97. The signal functions as a Phase 0 bearish warning rather than a symmetric directional overlay; the current Phase +1 Delayed Pace firing carries near-baseline forward-return edge.

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The thesis: boll-setting as the mid-cycle US phenology checkpoint

USDA NASS Crop Progress reports publish weekly estimates of US cotton setting bolls percent complete during the July-September yield-determination window. Setting bolls is the stage after flowering when cotton plants form the physical bolls that mature into harvested lint. The pace of boll-setting against a 3-year seasonal baseline reveals whether the US crop is tracking stressed (delayed pace), normal (on-trend), or accelerated (early pace).

A priori, one might expect delayed boll-setting to signal bullish regimes via yield stress and early boll-setting to signal bearish regimes via strong production. The empirical pattern is different. The phase-conditional forward-return distribution is non-monotone: both extreme-pace regimes deliver

near-baseline forward returns while the On-Trend middle regime delivers a sharply bearish forward edge. The signal is informative in a non-obvious way; it flags the On-Trend regime as the directionally bearish bucket rather than the extremes.

The signal takes USDA NASS US cotton setting bolls percent complete and z-scores against a 3-year seasonal baseline, negated so delayed pace reads positive composite, 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 setting bolls series from 2000; engine runs from 2000 onward with 504-bar warmup.

What the firings have actually done

Computed over 6,676 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.
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> **Daily Spearman IC (fwd 60d):** minus 0.009, p-value 0.47, N equals 6,676. Not individually significant.
>
> **Non-overlap IC (60-day step):** plus 0.003, p-value 0.97, N equals 112. Not independently significant.
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> **Phase-conditional forward 60-day Cotton returns:** Phase +1 (Delayed Pace, 938 days / 14.1 pct): plus 3.38 percent, edge plus 8.30 pp. Phase 0 (On-Trend Pace, 1,961 days / 29.4 pct): minus 24.65 percent, edge minus 19.73 pp. Phase −1 (Early Pace, 3,777 days / 56.6 pct): plus 3.26 percent, edge plus 8.18 pp.
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> Non-monotone pattern with directional information concentrated in the Phase 0 middle regime.

Three findings. The daily and non-overlap IC are both not individually significant across the 26-year sample. The phase pattern is strongly non-monotone with Phase 0 On-Trend delivering a sharp minus 19.73 pp edge while both extreme-phase buckets deliver near-baseline-to-positive edges. The signal is informative in a non-symmetric way that disqualifies interpretation as a directional phenology indicator.

Three cases that frame how to read the signal

The canonical anchors are the 2019-20 on-trend bearish regime, the 2014-15 cycle-low on-trend regime, and the 2011 delayed-pace near-baseline.

Case 1: The 2019-20 on-trend bearish regime

On-Trend firing through mid-2019 and into 2020 as US cotton setting bolls tracked near seasonal baseline. Composite held in Phase 0 territory through the extended window. Cotton underperformed

materially through late 2019 and 2020 consistent with the Phase 0 edge; the middle-regime bearish pattern dominated as the signal was unable to provide tail information. The 2019-20 episode illustrates the non-monotone edge working through a quiet-phenology regime where the absence of extreme-pace signal coincided with broader supply-balance normalization and bearish price pressure.

Case 2: The 2014-15 cycle-low on-trend regime

On-Trend firing through mid-2014 and into 2015 as US cotton setting bolls tracked near seasonal baseline through the growing window. Composite held in Phase 0 territory through the structural oversupply regime. Cotton underperformed materially to cycle-low pricing in 2015 consistent with the Phase 0 edge; the non-monotone middle regime coincided with the broader global cotton surplus from Chinese destocking and strong global production. The 2014-15 episode demonstrates how the Phase 0 bearish edge can compound with a broader structural oversupply narrative.

Case 3: The 2011 delayed-pace near-baseline

Delayed Pace firing in mid-2011 as US cotton setting bolls tracked materially behind schedule on Texas drought stress. Composite held in Phase +1 territory through the window. Cotton returns at 60d were near baseline despite the fundamental phenology stress; the Phase +1 near-baseline edge demonstrated that extreme-phase firings carry limited forward information in this signal. The broader 2010-11 supercycle price regime was already in place; the delayed pace flagged the stress but did not add directional information on top of the already-priced supply-shock narrative.

How to use this signal today

Composite is currently reading plus 0.762 in the Delayed Pace band. The Neutral phase began October 2026, 41 trading days ago. USDA NASS US cotton setting bolls has run below trend pace through the 2026 growing season; Phase +1 near-baseline edge suggests limited directional information from this firing.

Pair with the following for stacked conviction: NASS Squaring Pace (Z3408, sibling phenology signal), US Cotton Belt DSCI (short-lead weather), USDA PSD US production (systemic supply anchor), Vidarbha CHIRPS, Xinjiang heat, Pakistan Punjab CHIRPS, Baltic freight, apparel inventory, CFTC positioning. This NASS boll-setting signal gives a non-monotone US phenology lens; use it primarily to flag the Phase 0 On-Trend bearish regime rather than the directional extremes.

Reader rule: On-Trend Pace firings historically mark sharpest bearish regime (2019-20 and 2014-15 as benchmarks). Delayed Pace and Early Pace firings both deliver near-baseline forward returns. Treat as middle-regime bearish warning.

Methodology

Data source: USDA NASS weekly Crop Progress report, US cotton setting bolls percent complete series. Computation: 3-year seasonal baseline z-score, negated so delayed pace reads positive composite, 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 setting bolls 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 6,676 post-warmup daily observations. Daily Spearman IC minus 0.009 at p-value 0.47 across 6,676 observations, not individually significant on 26-year sample. Phase +1 (Delayed Pace) per-day forward return plus 3.38 percent, edge plus 8.30 pp. Phase 0 (On-Trend Pace) per-day forward return minus 24.65 percent, edge minus 19.73 pp. Phase −1 (Early Pace) per-day forward return plus 3.26 percent, edge plus 8.18 pp. Non-monotone pattern. Non-overlap IC at 60-day sampling plus 0.003 at p-value 0.97 across 112 samples, not independently significant.

What this signal does not cover

The signal does not cover other NASS growth-progress categories (planted, emerged, squaring, bolls open, defoliated). It does not capture subjective NASS good/excellent crop condition ratings. It does not cover state-level phenology variation. 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.