The USDM Drought Corn States Signal, A Direct Yield-Impact Lens

Reading the U.S. Drought Monitor seven-state corn-belt D2-plus severity composite, 2000 to today. Direct interpretation – more drought equals bullish corn via the yield-impact pathway. Daily Spearman IC plus 0.2117 at p-value 9.060e-68; non-overlapping 60-day-block IC plus 0.2075 at p-value 0.0289. The robust standalone directional signal in the corn library.

David Stendahl · Market Lab Analytics · November 2, 2026

What this signal is

Drought conditions across the U.S. corn belt are the single most direct yield-risk read available to a corn trader. The U.S. Drought Monitor categorizes severity from D0 abnormally dry to D4 exceptional drought on a weekly county-level map. This signal takes the state-level D2-plus severity area share across seven production-dominant corn-belt states (Iowa, Illinois, Indiana, Nebraska, Minnesota, Ohio, Missouri – collectively approximately 80 percent of U.S. corn production), averages across states, forward-fills daily, z-scores on a 756-trading-day rolling window, and tanh-bounds.

The signal reads directly: HIGHER composite means MORE drought across the belt; LOWER means less. The empirical pattern is monotone bullish for corn as drought intensifies. The daily Spearman information coefficient against CBOT corn forward 60-day return is plus 0.2117 at p-value 9.060e-68 across 6,603 live-signal days – deeply significant.

The important secondary statistic – the one that separates this signal from most commodity composites in the library – is the non-overlapping 60-day-block information coefficient, which remains plus 0.2075 at p-value 0.0289 across 111 independent blocks. Commodity signals typically see non-overlap p-values collapse because the daily IC is autocorrelation-inflated. This one survives.

Current reading, as of October 30, 2026: composite plus 0.0870, in the Mild drought band. The seven-state D2-plus area share is running near its three-year rolling norm. No acute drought regime is firing today. The signal becomes directional when the composite leaves the Mild band.

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How the USDM corn-belt composite composes

Direct observation. U.S. Drought Monitor weekly maps published Tuesday mornings by the National Drought Mitigation Center with NOAA and USDA cooperation. State-level D2 (severe drought), D3

(extreme drought), and D4 (exceptional drought) severity area percentages queried from the estate weather database (`weather_data.USDM_DROUGHT_STATE`).

Seven-state construction. Iowa, Illinois, Indiana, Nebraska, Minnesota, Ohio, and Missouri. These seven states cover approximately 80 percent of U.S. corn production. The signal takes the equal-weight mean of D2-plus area share across these seven states per weekly map date. A production-weighted variant is in the research queue; the equal-weight construction is the baseline for consistency with similar belt-aggregate signals.

Derived comparison. Weekly state-level averages are forward-filled to daily frequency. Z-scored on a 756-trading-day (3-year) rolling window with 126-day minimum. Tanh-bounded to the plus-or-minus one scale. The three-year window balances responsiveness to multi-year drought cycles against week-to-week noise.

State thresholds. Market_Phase_Int uses plus-or-minus 0.3 on the composite – plus 1 if above plus 0.3 (Severe drought), minus 1 if below minus 0.3 (No drought), zero in between (Mild drought). The Phase 0 statistical analysis also computes per-day band statistics at plus-or-minus 0.5 as a sensitivity check.

The interpretation is DIRECT. Elevated USDM drought means the belt is water-stressed; the yield-impact mechanism prices acute severity forward. This is the opposite of the Z4426 Corn Belt Hail Activity signal (which is contrarian, because hail reports proxy wet-regime synoptic patterns rather than crop damage). The USDM signal is the clean direct read; the hail signal is the clean contrarian read; the two together triangulate the belt weather regime.

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What the state-conditional returns have actually done

> **Reference baseline, CBOT Corn fwd 60-day unconditional**
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> CBOT Corn front-month back-adjusted continuous forward-60-day return baseline over the live-signal window of 2000-05-09 through 2026-10-30: mean plus 0.53 percent, median minus 1.31 percent, standard deviation 12.45 percent, percent negative 56.2 percent. The baseline is the direct comparator for the state-conditional means that follow.

Per-day sampling at the plus-or-minus 0.5 extreme bands (Phase 0 statistical panel). High drought state (composite above plus 0.5) covers 29.4 percent of the 6,603-day sample, 1,959 state-days. Per-day mean plus 4.93 percent, edge plus 4.40 pp above baseline. The direct-mechanism firing. Mild drought (composite between minus 0.5 and plus 0.5) covers 30.3 percent, 2,021 days, per-day mean minus 0.25 percent, edge minus 0.78 pp below baseline. No drought (composite below minus 0.5) covers 40.3 percent, 2,683 days, per-day mean minus 2.11 percent, edge minus 2.64 pp. Clean monotone pattern from no-drought underperformance through the high-drought payoff.

The regime table on the live signal page uses a different sampling methodology – run-entry sampling with plus-or-minus 0.3 bands, driven by the engine's Market_Phase_Int three-state machine. Under that methodology the pattern remains monotone with the Severe drought regime delivering plus 1.20 percent fwd 60-day and the No drought regime plus 0.84 percent against a run-entry baseline. Both

methodologies agree the directional edge sits in the Severe drought tail; the magnitude differs because the plus-or-minus 0.5 bands catch deeper excursions than the plus-or-minus 0.3 bands.

Directional spread, per-day plus-or-minus 0.5: plus 7.04 pp from No drought to High drought. One of the strongest state-conditional patterns in the corn library.

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Three cases that frame how to read this signal

Case 1: Summer 2012. The Great Plains mega-drought.

The 2012 drought summer produced one of the most severe droughts in the modern record across the central U.S. corn belt. USDM D2-plus coverage across Iowa, Illinois, Indiana, Nebraska, Minnesota, Ohio, and Missouri climbed above 70 percent through July and August. The composite ran deep in the Severe drought band for the entire pollination and grain-fill window. CBOT corn rallied from the mid-500 cents range in May to above 800 cents by mid-August as yield losses were priced in. The signal was in the High drought band through this entire episode; the historical anchor for the plus 4.93 percent state-conditional forward edge.

Case 2: Summer 2022. The Western-states drought.

The 2022 growing season brought a persistent dry regime across the western half of the corn belt, centered on Nebraska, Iowa, and the Dakotas. USDM D2-plus coverage climbed through June and July. The composite moved into the Severe drought band through much of the pollination window. Corn rallied from the mid-600s to above 800 cents by mid-year on yield-concern pricing. The 2022 episode is a clean modern anchor for the signal's bullish-corn interpretation of acute belt drought.

Case 3: Current. Near-neutral in the post-growing-season window.

As of October 30, 2026, the composite reads plus 0.0870, in the Mild drought band for the 53rd consecutive trading day. The seven-state D2-plus drought-area share is running near its three-year rolling norm. The signal is not firing an acute regime. The current reading is a transitional-zone read; the directional edge sits in the Severe drought tail, not the middle band. Monitor for a transition out of the Mild band in either direction.

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How to use the signal today

As of November 2, 2026, the composite reads plus 0.087 and the state is Mild drought. The directional edge sits in the tails; today's near-neutral reading is informative-but-not-directional.

Pair with three confirming reads:

- **Z4381 Corn Silking Pace.** The pollination-vulnerability phenology signal. Belt drought during the July silking window amplifies the yield-impact mechanism; the two signals compound at the extremes.
- **Z4389 Corn Emerged Pace.** The early-season phenology signal. Spring drought conditions can delay emergence and shift the full growing-season risk window.
- **Z4426 Corn Belt Storm Hail Activity.** The complementary severe-weather signal. Hail-activity and drought regimes are inversely related; low hail co-occurs with the dry-regime signature.

The USDM signal is one of the few in the corn library that passes non-overlap robustness; the stand-alone directional read is defensible when the composite leaves the Mild band.

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Methodology notes

Data sources. U.S. Drought Monitor weekly state-level D2, D3, D4 severity area percentages. Published Tuesday mornings by the National Drought Mitigation Center with NOAA and USDA. Target: CBOT Corn front-month back-adjusted continuous close.

Signal construction. Equal-weight mean of D2-plus-D3-plus-D4 severity area shares across seven corn-belt states (IA, IL, IN, NE, MN, OH, MO). Weekly cadence forward-filled to daily. Z-scored on 756-trading-day rolling window with 126-day minimum. Tanh-bounded to plus-or-minus one. INTERPRETATION: direct (more drought equals bullish corn).

Validation statistics. Daily Spearman IC against CBOT corn fwd 60-day return is plus 0.2117 at p-value 9.060e-68 across 6,603 live-signal days. Non-overlapping 60-day-block IC is plus 0.2075 at p-value 0.0289 across 111 independent blocks – clean significant and unusual for commodity signals. Three-regime per-day means at plus-or-minus 0.5 bands: High drought plus 4.93 percent (edge plus 4.40 pp vs plus 0.53 percent baseline), Mild minus 0.25 percent (edge minus 0.78 pp), No drought minus 2.11 percent (edge minus 2.64 pp). Monotone pattern; plus 7.04 pp spread from no-drought to high-drought.

Live-page regime table sampling. The engine's Market_Phase_Int three-state machine uses plus-or-minus 0.3 bands. Live-page regime_table statistics are computed via run-entry sampling (one observation per state transition) which differs from the per-day Phase 0 panel. Both methodologies agree on direction and monotone structure; magnitudes differ because run-entry under-samples the deep-tail persistent runs.

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What this signal does not cover

First, the signal is a state-aggregate composite. Localized drought stress concentrated on prime acreage within a single state can produce yield impact that the seven-state average does not isolate.

Second, the equal-weight state construction treats Iowa and Missouri as equivalent inputs despite Iowa's roughly 4x larger corn production. A production-weighted variant is in the research queue.

Third, USDM categorical ratings are human-expert assessments informed by multiple inputs (precipitation deficits, soil moisture, streamflow, vegetation indices). The categorical nature means the signal does not pick up intra-category stress intensification until a county crosses a D-level threshold.

Fourth, climate change trends in drought frequency may shift the three-year rolling baseline faster than the signal updates; the z-score reference window is a rolling three years rather than a fixed historical reference, which partially addresses this but does not eliminate it.

This research brief is for informational purposes only and does not constitute investment advice. Data sources: U.S. Drought Monitor weekly state-level severity data (NOAA, USDA, National Drought Mitigation Center), CBOT Corn front-month back-adjusted continuous target. State-conditional statistics computed through 2026-10-30.