

AgriGuard MCSI Interpretation Guide

Multivariate Corn Stress Index Technical Reference

MCSI Components Overview

The Multivariate Corn Stress Index (MCSI) combines multiple environmental and vegetation measurements to provide a comprehensive assessment of corn crop health across Iowa's 99 counties.

Components:

1. NDVI Index - Vegetation greenness and density from MODIS satellite
2. LST Index - Land Surface Temperature measuring heat stress
3. VPD Index - Vapor Pressure Deficit measuring atmospheric dryness
4. Water Index - Soil moisture balance from ETo minus Precipitation

All components are converted to a 0-100 scale where higher values indicate healthier conditions.

NDVI Interpretation

Source: MODIS satellite imagery (MOD13A1.061)

Resolution: 500 meters, 16-day composite

NDVI Thresholds:

- Raw NDVI greater than 0.75 (Index 90-100): Excellent canopy
- NDVI 0.60-0.75 (Index 70-89): Good health
- NDVI 0.45-0.60 (Index 50-69): Moderate stress
- NDVI 0.30-0.45 (Index 30-49): Significant stress
- NDVI less than 0.30 (Index 0-29): Severe stress or bare soil

Peak NDVI values typically occur during the silking stage (weeks 10-12 of the growing season).

LST Heat Stress Interpretation

Source: MODIS satellite imagery (MOD11A2.061)

Critical threshold: 32C (90F) for pollination stress

Temperature to Index Conversion:

- Less than 25C (Index 90-100): Optimal, cool conditions
- 25-30C (Index 70-89): Normal range
- 30-35C (Index 50-69): Moderate heat stress
- 35-40C (Index 30-49): High heat stress
- Greater than 40C (Index 0-29): Severe heat stress

Composite MCSI Stress Levels and Actions

Score Categories:

80-100 HEALTHY: Continue normal management practices.

70-79 GOOD: Monitor conditions but no immediate action needed.

50-69 MILD STRESS: Increase monitoring frequency and review forecasts.

30-49 MODERATE STRESS: Consider intervention, check individual stress components to identify cause, prepare

contingency plans.

0-29 SEVERE STRESS: Immediate action required. Check soil moisture immediately, consider emergency irrigation, scout for compounding pest or disease issues, begin yield loss assessment, evaluate alternative harvest options such as silage.