Evaluation of the Impact of Growing Season Moisture on Burley Crop Quality

by

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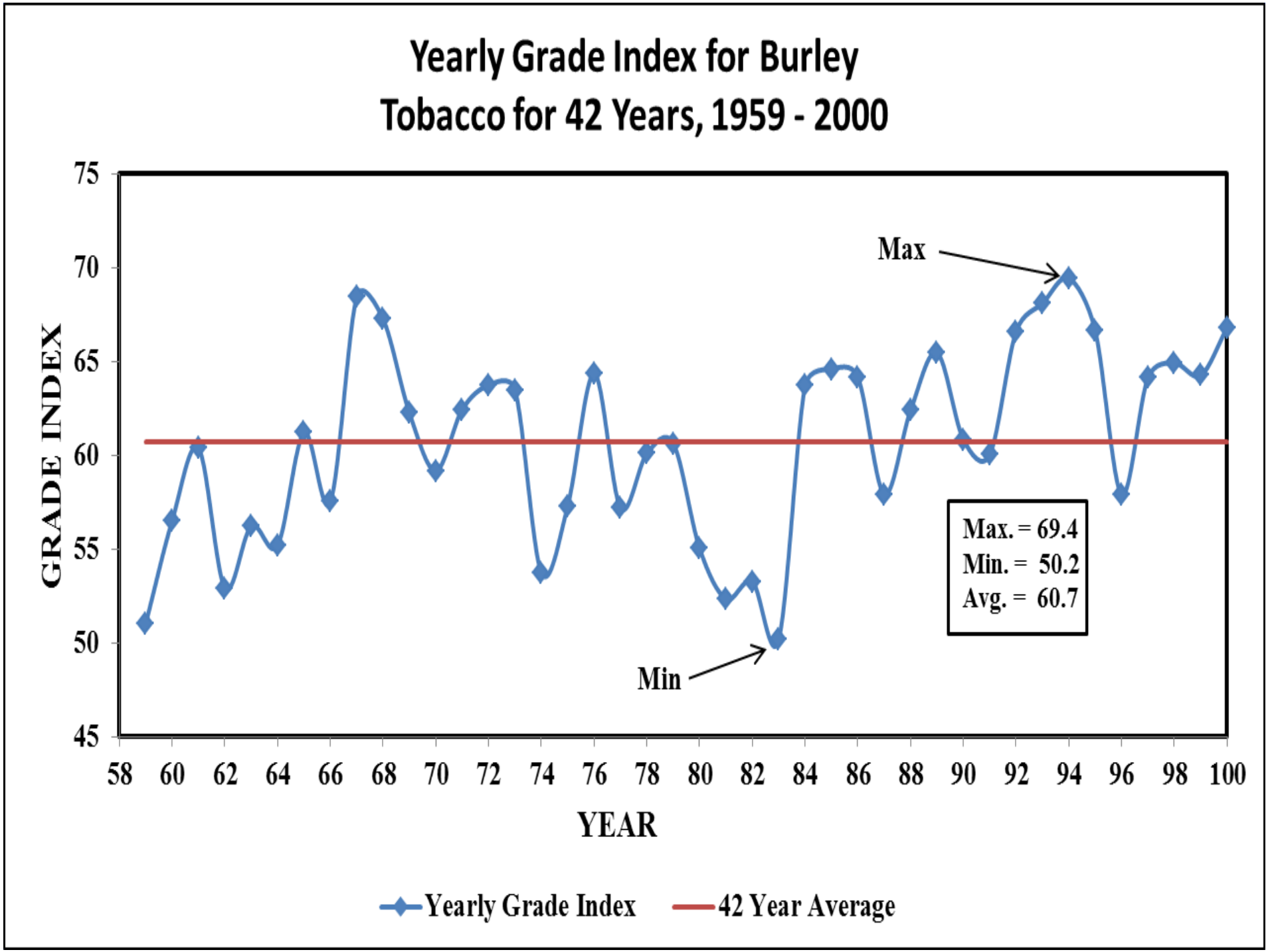
CROP QUALITY MEASURE

- Burley Grade Index
- Developed By Bowman et al., 1989
- Numerical Index Based on Government Grading System
- Purpose is to Provide a Uniform Assessment of Leaf Quality
- Generally the Higher the Grade Index, the Better the Overall Crop Quality

GRADE INDEX MAKEUP

- There Are Approximately 110 Burley Grades
- Yearly Index Determined From Sales Percentages for the Individual Grades
- Calculated for 42 Years (1959 – 2000)



COLOR GROUP DATA

- **TAN (BUFF)**

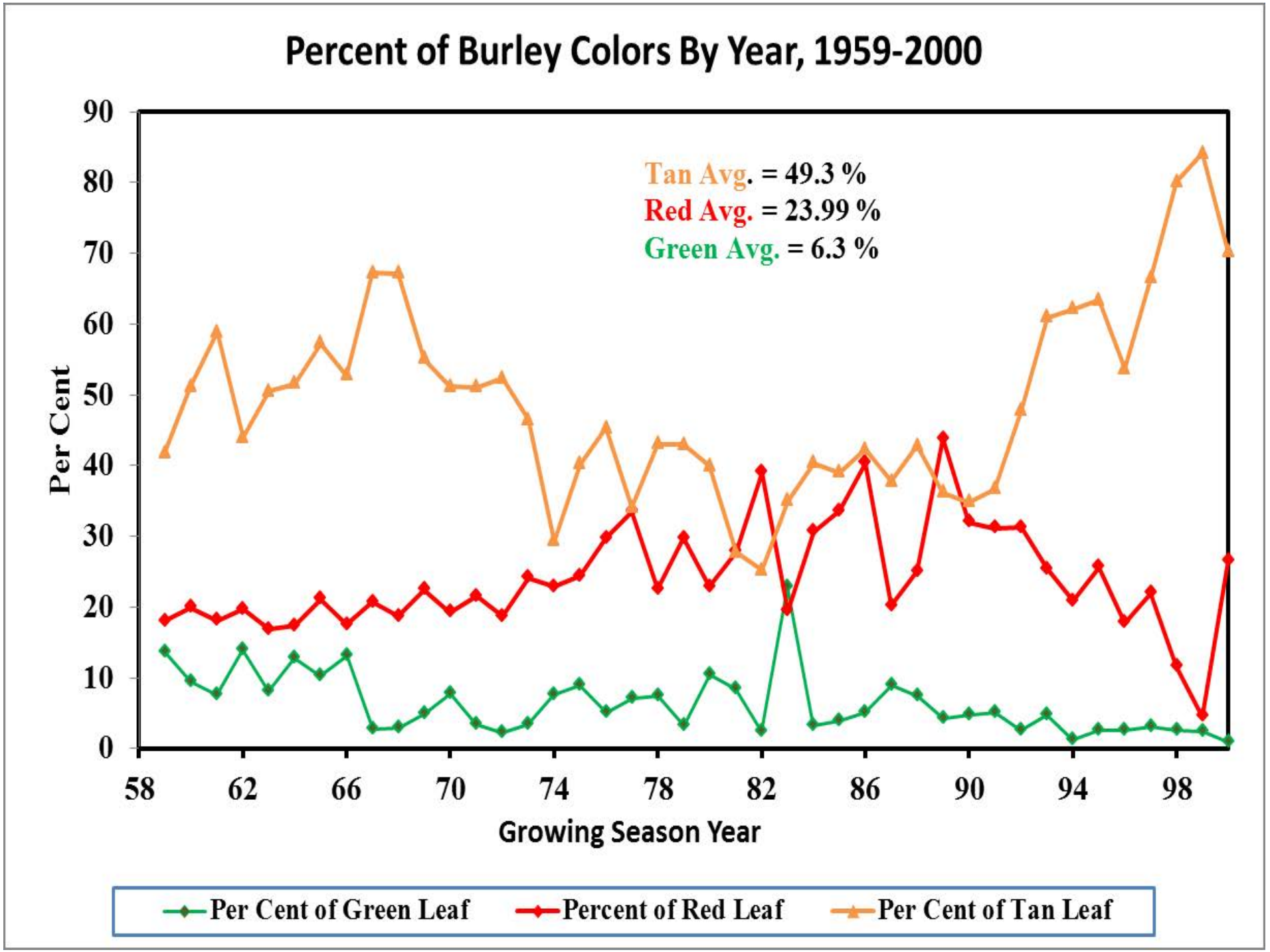
  XL, XF, CL, CF, BF and TF

- **RED (TANNISH RED)**

  BFR, BR, TFR, TR and MFR

- **GREEN**

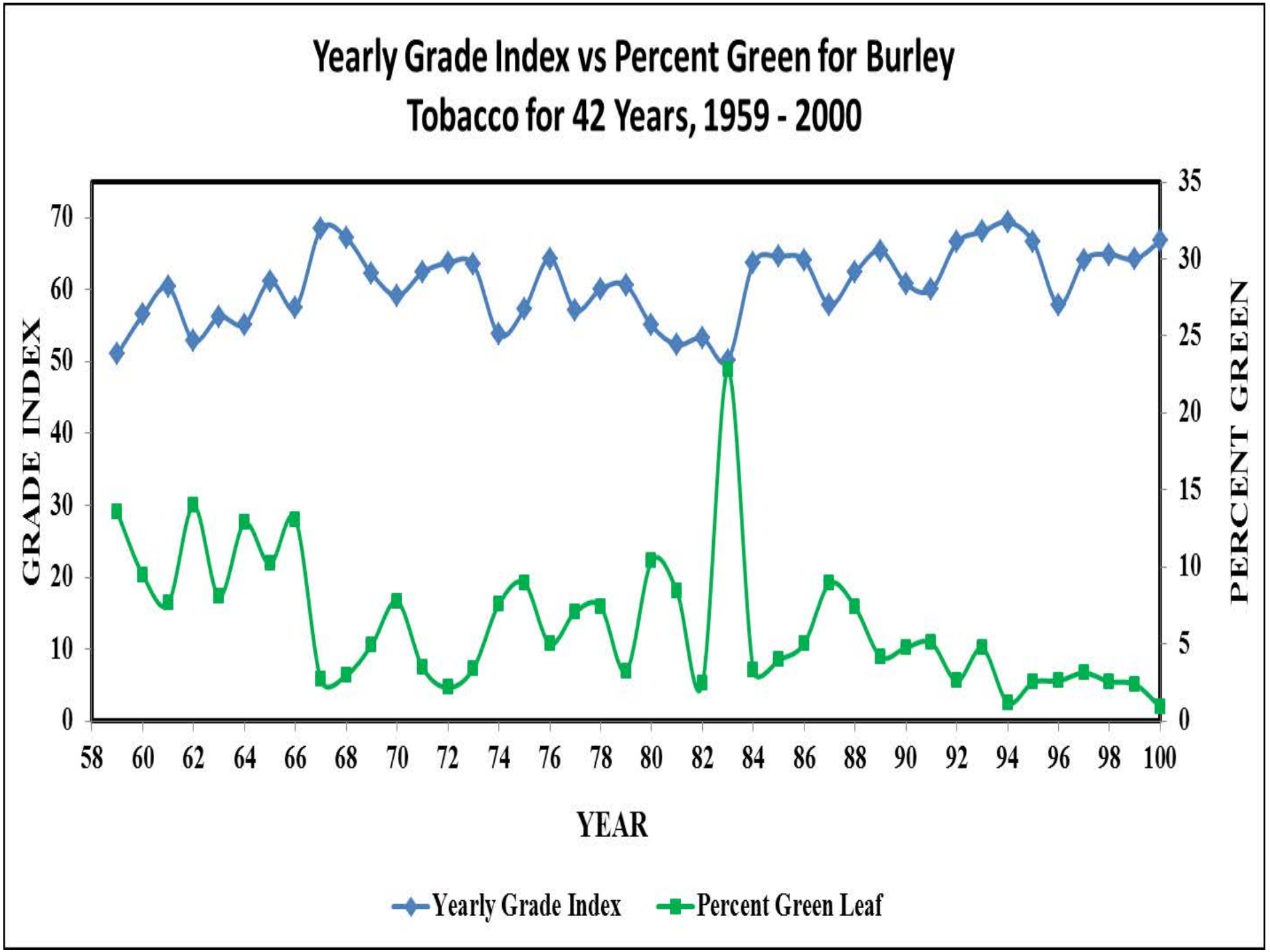
  V, VF, VR, G, GF and GR



HOW DO THE VARIOUS COLOR GROUPS INFLUENCE QUALITY?

COLOR GROUP CORRELATIONS

Group	Grade Index Correlation
TAN	0.5859**
	<0.0001
RED	0.1161ns
	0.4642
GREEN	-0.7584**
	<0.0001



GREEN COLOR

- Very Undesirable in Terms of Quality
- Generally Most Green Color Occurs When Improper Curing Conditions Exist
- Some Researchers Believe That Some Green Color Caused During the Growing Season

RESULTS FROM PREVIOUS STUDY

STUDY VARIABLES

- 42 Years (1959 – 2000) Daily Precipitation and Evapotranspiration
- Three Kentucky Locations

  Lexington, Louisville and Paducah
- Growing Season Available Moisture Index

AVAILABLE MOISTURE INDEX (AVI)

- Precipitation Minus Evapotranspiration
- Search for Time Periods During The Growing Season When AVI Was Correlated to the Per Cent of Green Color
- Three Periods Identified – One at Each Location
- Critical Moisture Intervals (CMI)

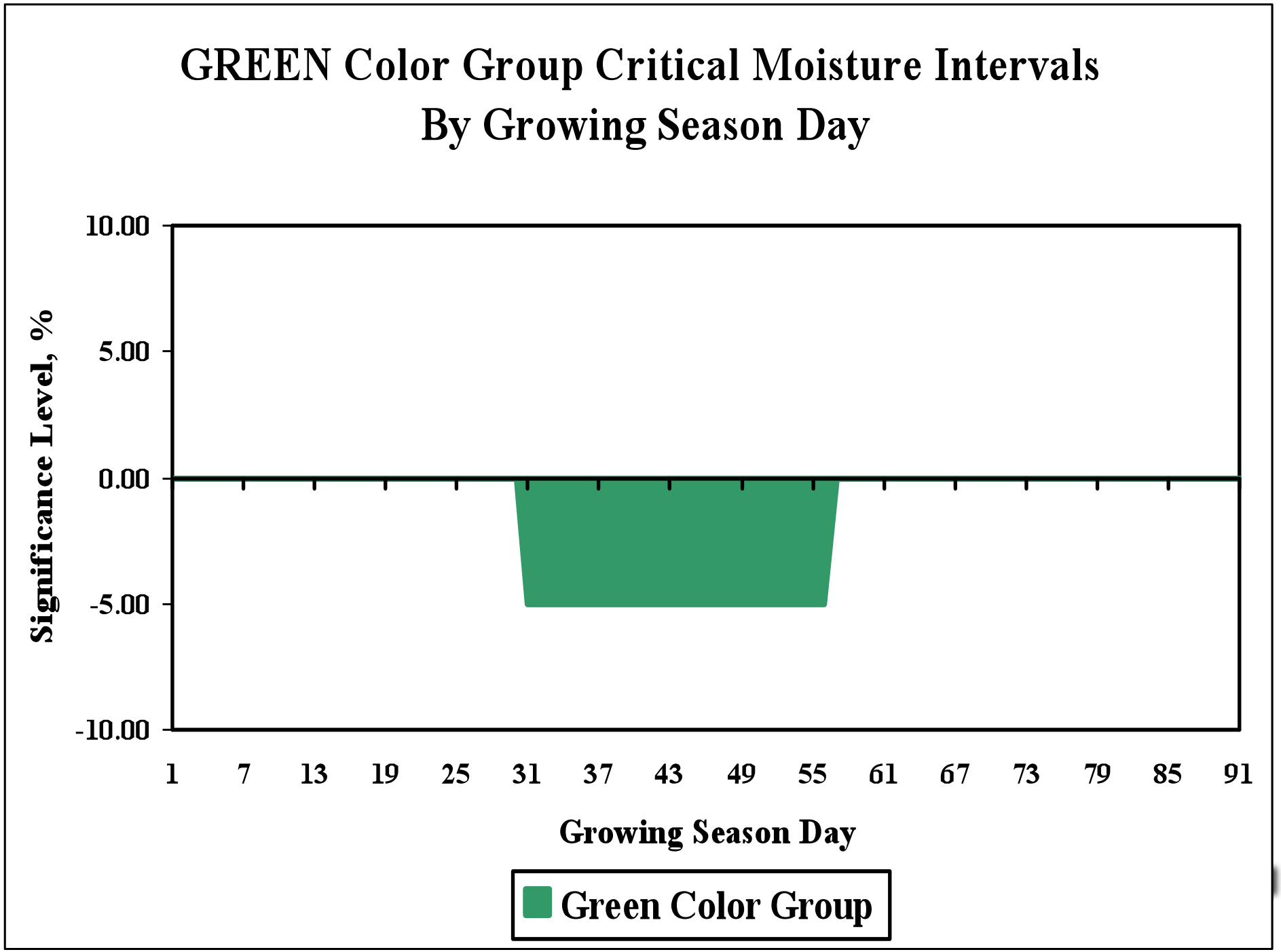
CMI for GREEN COLOR (Mid Growing Season)

LOCATION	Starting Day	Length Days	CMI Correlation
Lexington	34	25	-0.4295**
Louisville	26	28	-0.5089**
Paducah	32	26	-0.3915*

* < 5 % ** < 1 %

LEXINGTON CMI CHARACTERISTICS

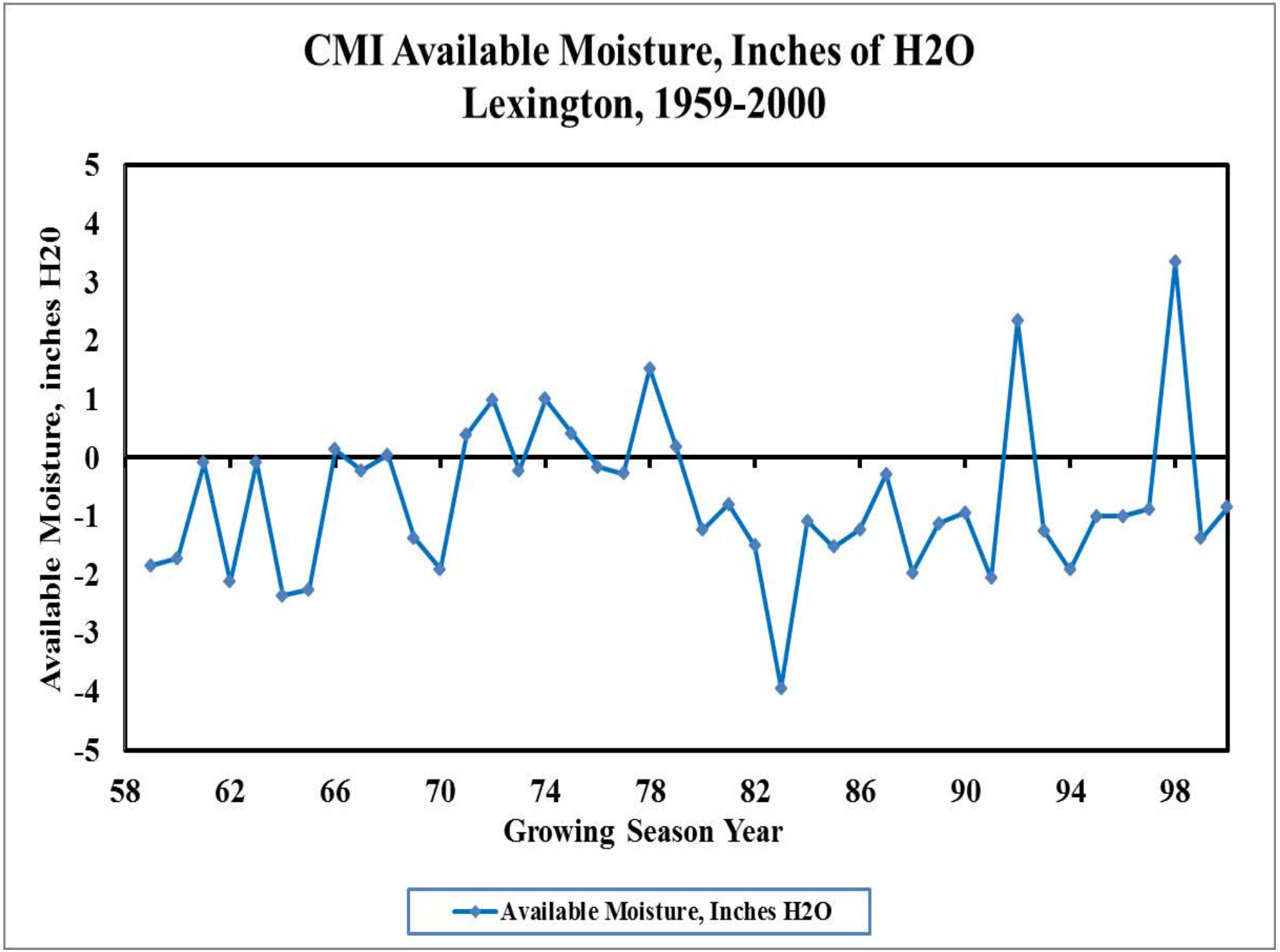
- Begins Day 34 (about 5 weeks into the Growing Season)
- Interval of 25 Days (about 3.5 Weeks)



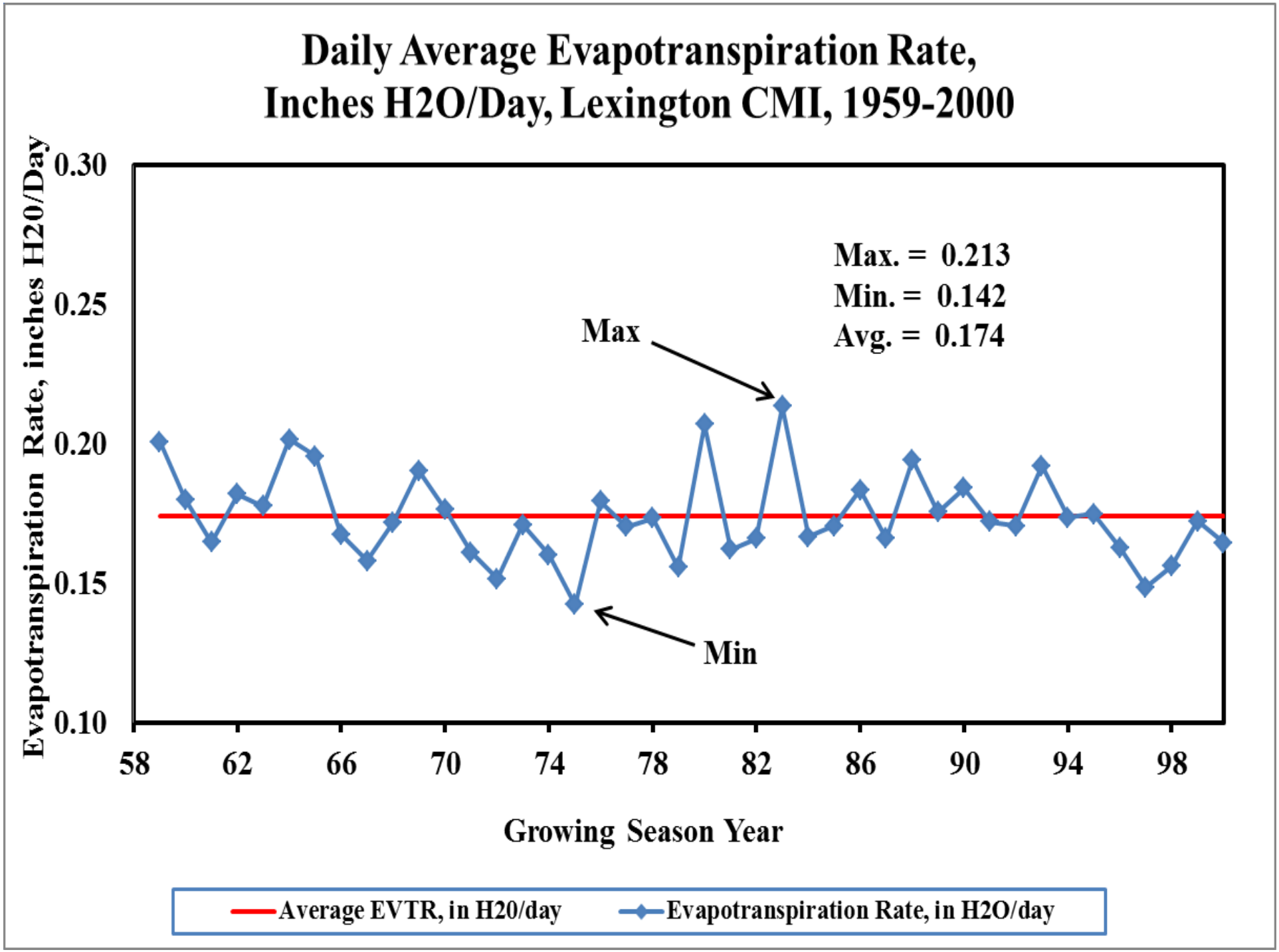
TWO QUESTIONS CONCERNING CMI

- Possible Causes for Green Color?
- How Much Green Color are These Conditions Responsible For?

Available Moisture During CMI



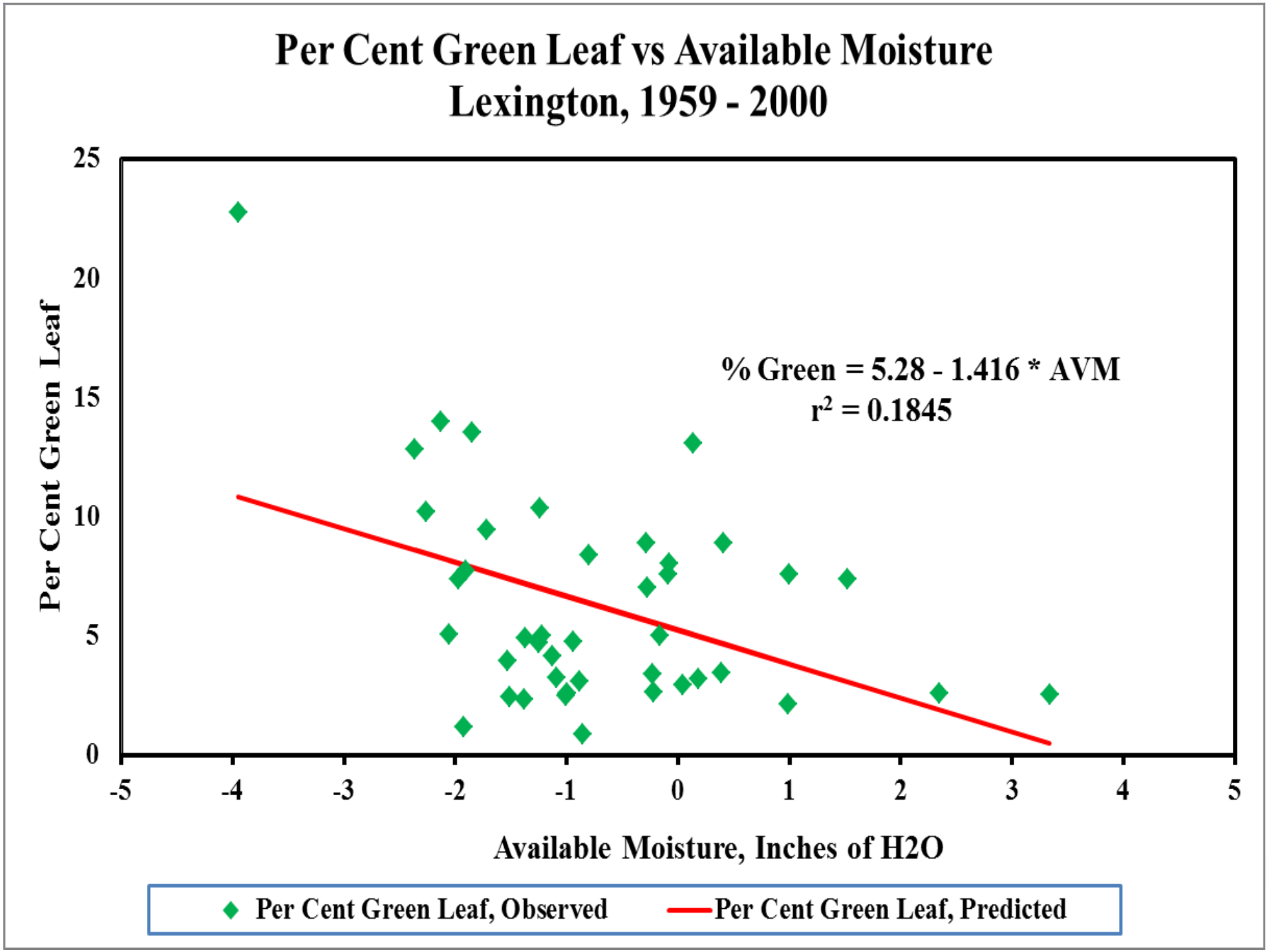
HOW MUCH MOISTURE IS NEEDED DURING CMI?



PLANT MOISTURE REQUIREMENTS FOR CMI

- Average Evapotranspiration Rate is 0.174 inches/day
- For 25 Day Interval, An Average of 4.35 inches H_2O Required to Satisfy Plant Needs
- 42 Years – Requirement Ranged from 3.56 to 5.33 inches

HOW MUCH GREEN COLOR DUE TO DEFICIT?



SUMMARY

- For Lexington CMI Plant Was In Moisture Deficit For 32 of 42 Years
- Estimate That Deficit May Be Responsible For Approximately 18 – 20 Per Cent of Green Burley Sold
- For Lexington an Average 4.35 Inches of Moisture Needed During CMI to Avoid a Moisture Deficit

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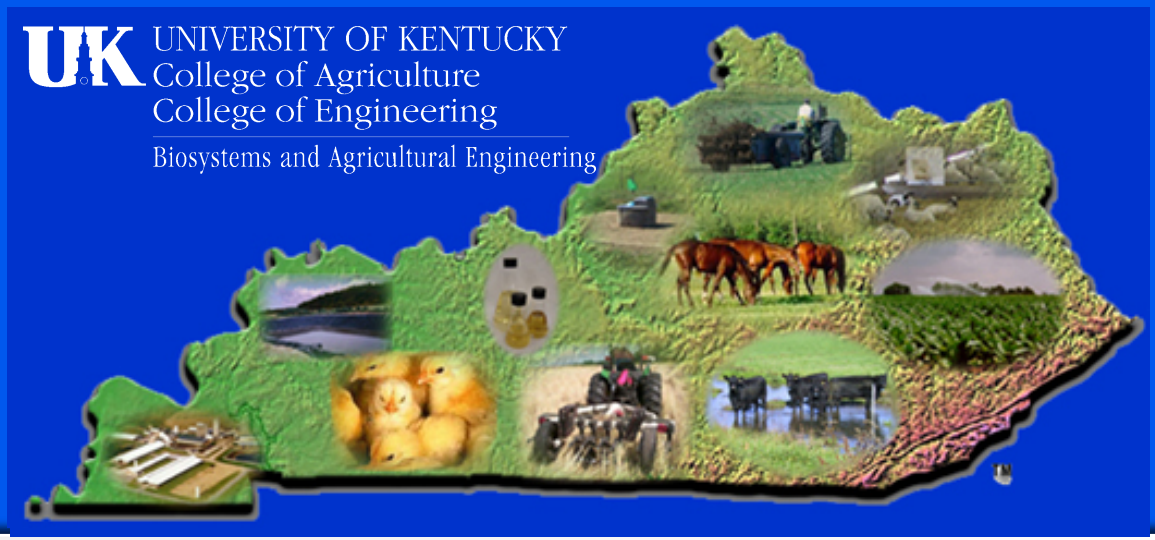

Soil Water Stress Test on Burley

Phillips, Leggett, Zelenznik and Sutton. 1984

TREATMENT	Rain inches	Irrigation inches	Yield lb/ac
Check	7.0	0.0	1125
Irrigated Full Season	0.4	6.0	2825
Early Stress	0.4	5.6	2875
Stressed Full Season	0.4	0.0	1250