

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

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by

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# **CROP QUALITY MEASURE**

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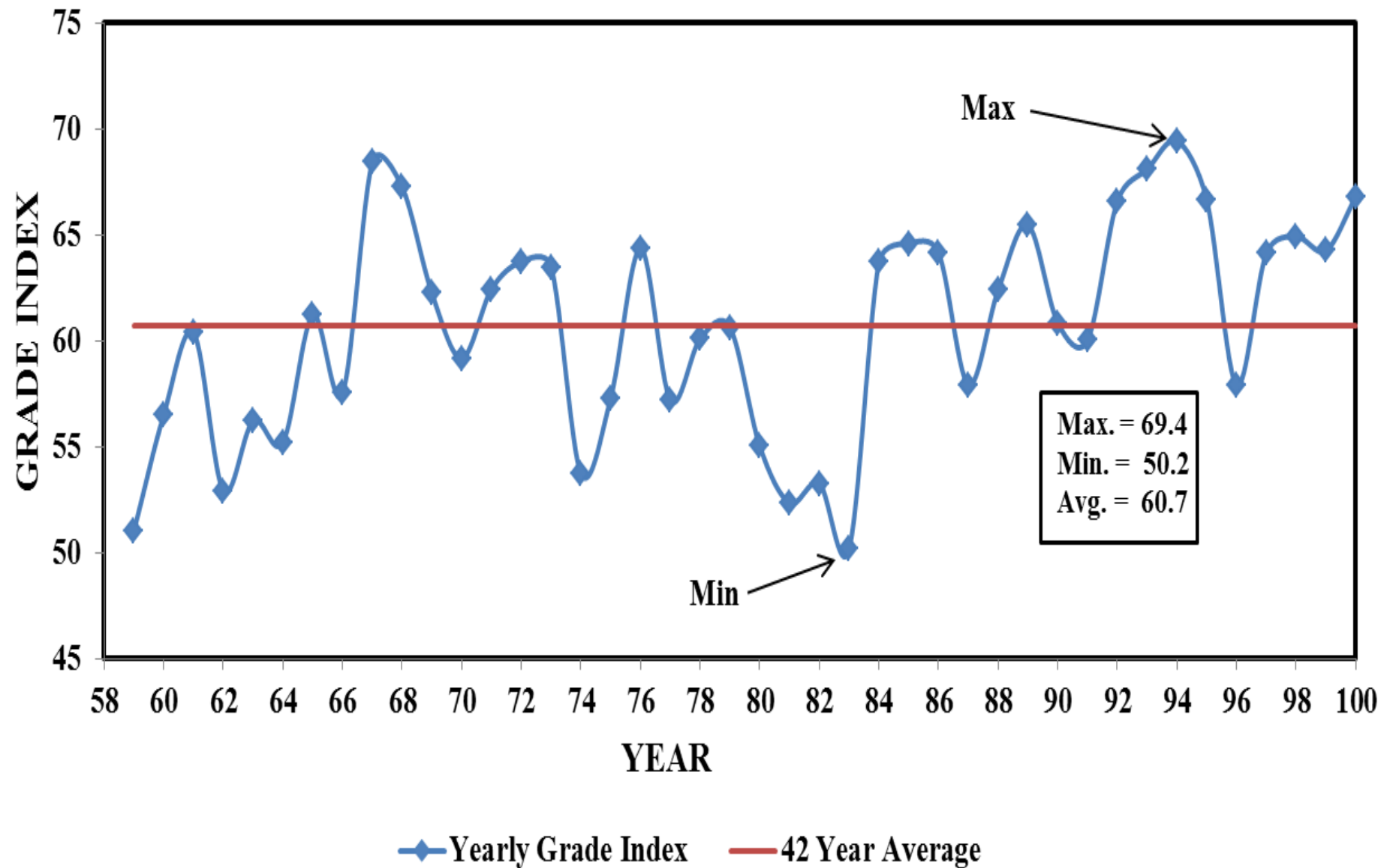
- **Burley Grade Index**
- **Developed By Bowman et al., 1989**
- **Numerical Index Based on Government Grading System**
- **Purpose is to Provide a Uniform Assessment of Leaf Quality**
- **Generally the Higher the Grade Index, the Better the Overall Crop Quality**

# GRADE INDEX MAKEUP

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

# Yearly Grade Index for Burley Tobacco for 42 Years, 1959 - 2000



# COLOR GROUP DATA

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- **TAN (BUFF)**

**XL, XF, CL, CF, BF and TF**

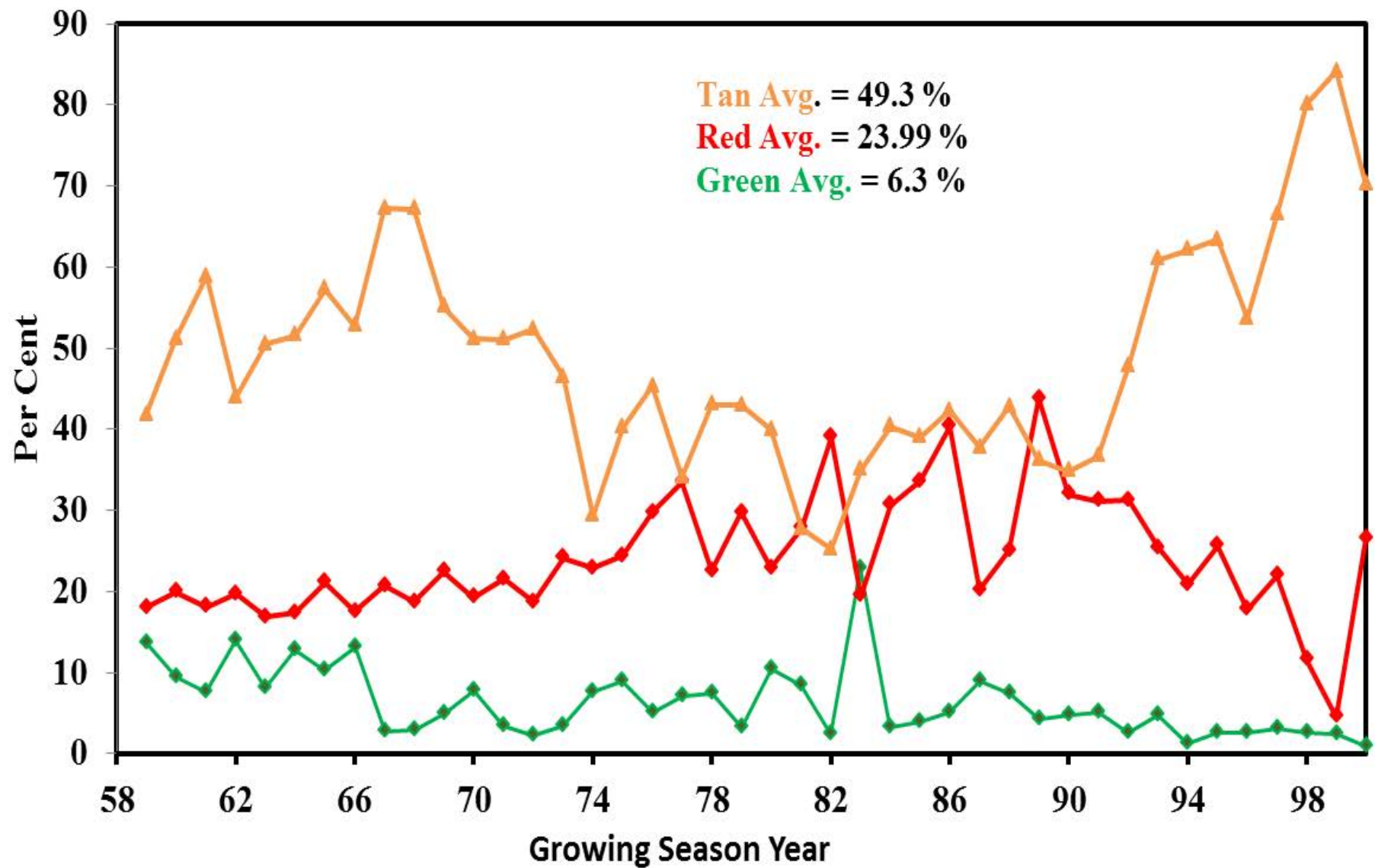
- **RED (TANNISH RED)**

**BFR, BR, TFR, TR and MFR**

- **GREEN**

**V, VF, VR, G, GF and GR**

## Percent of Burley Colors By Year, 1959-2000



◆ Per Cent of Green Leaf    ◆ Percent of Red Leaf    ◆ Per Cent of Tan Leaf

# HOW DO THE VARIOUS COLOR GROUPS INFLUENCE QUALITY?

# COLOR GROUP CORRELATIONS

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Group

Grade Index Correlation

TAN

0.5859\*\*

<0.0001

RED

0.1161<sup>ns</sup>

0.4642

GREEN

-0.7584\*\*

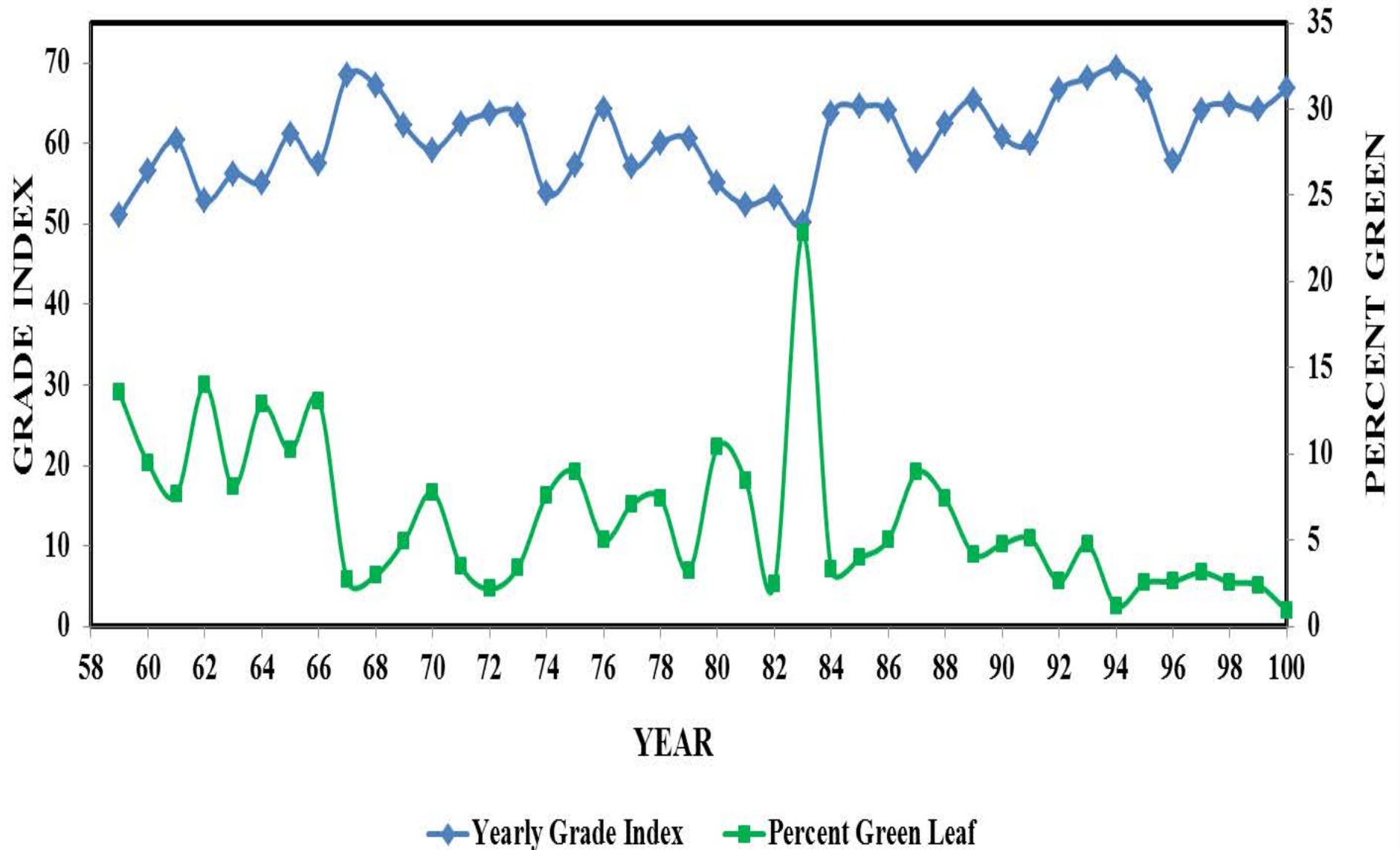
<0.0001

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The logo consists of the letters 'UK' in a bold, black, sans-serif font, enclosed within a white rectangular box. This box is positioned at the end of a horizontal line that is composed of three parallel white lines on a blue background.



# Yearly Grade Index vs Percent Green for Burley Tobacco for 42 Years, 1959 - 2000



# GREEN COLOR

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- **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

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- 42 Years (1959 – 2000) Daily Precipitation and Evapotranspiration
- Three Kentucky Locations  
Lexington, Louisville and Paducah
- Growing Season Available Moisture Index

# **AVAILABLE MOISTURE INDEX (AVI)**

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- **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)

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

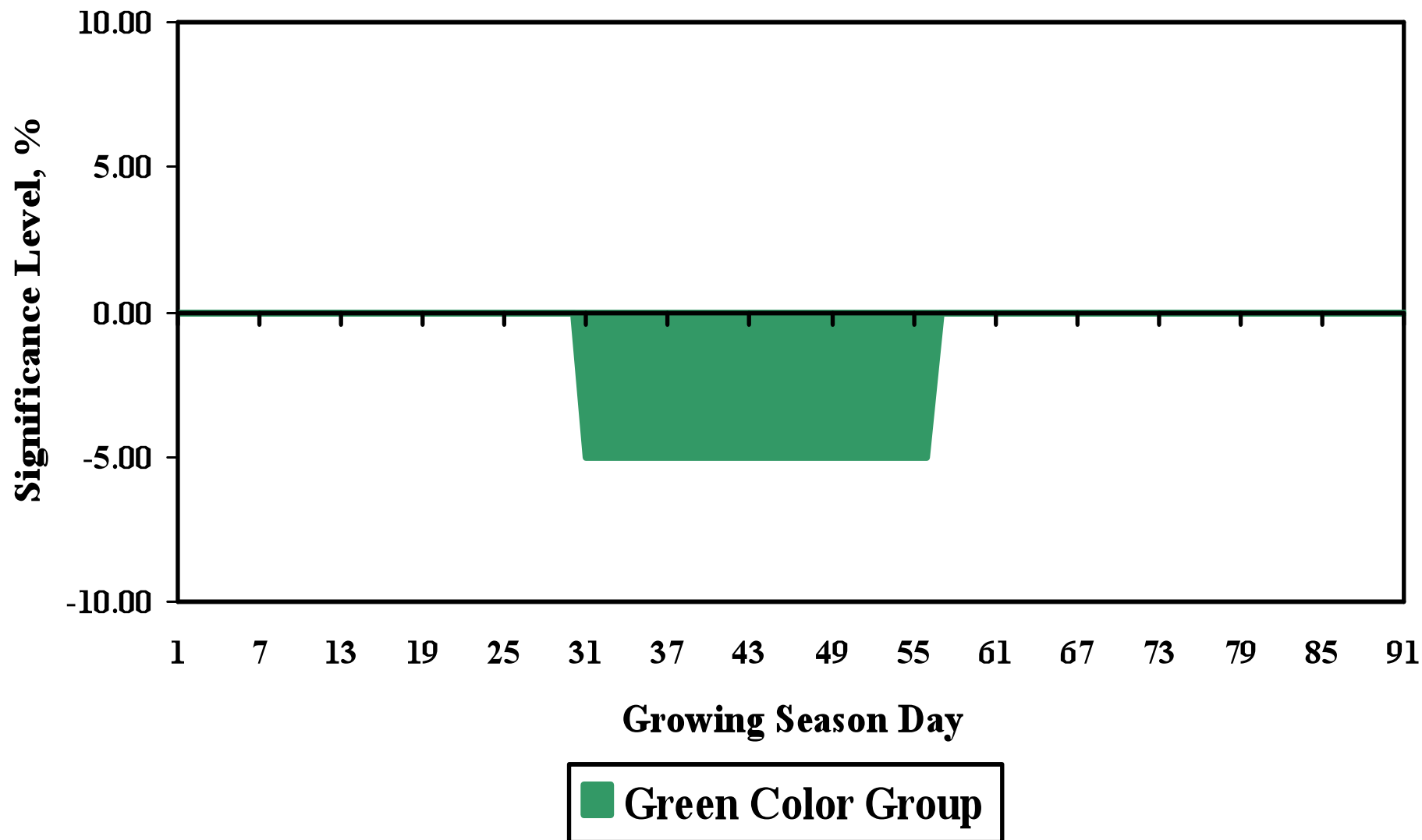
\* < 5 % \*\* < 1 %

# LEXINGTON CMI CHARACTERISTICS

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

# GREEN Color Group Critical Moisture Intervals By Growing Season Day





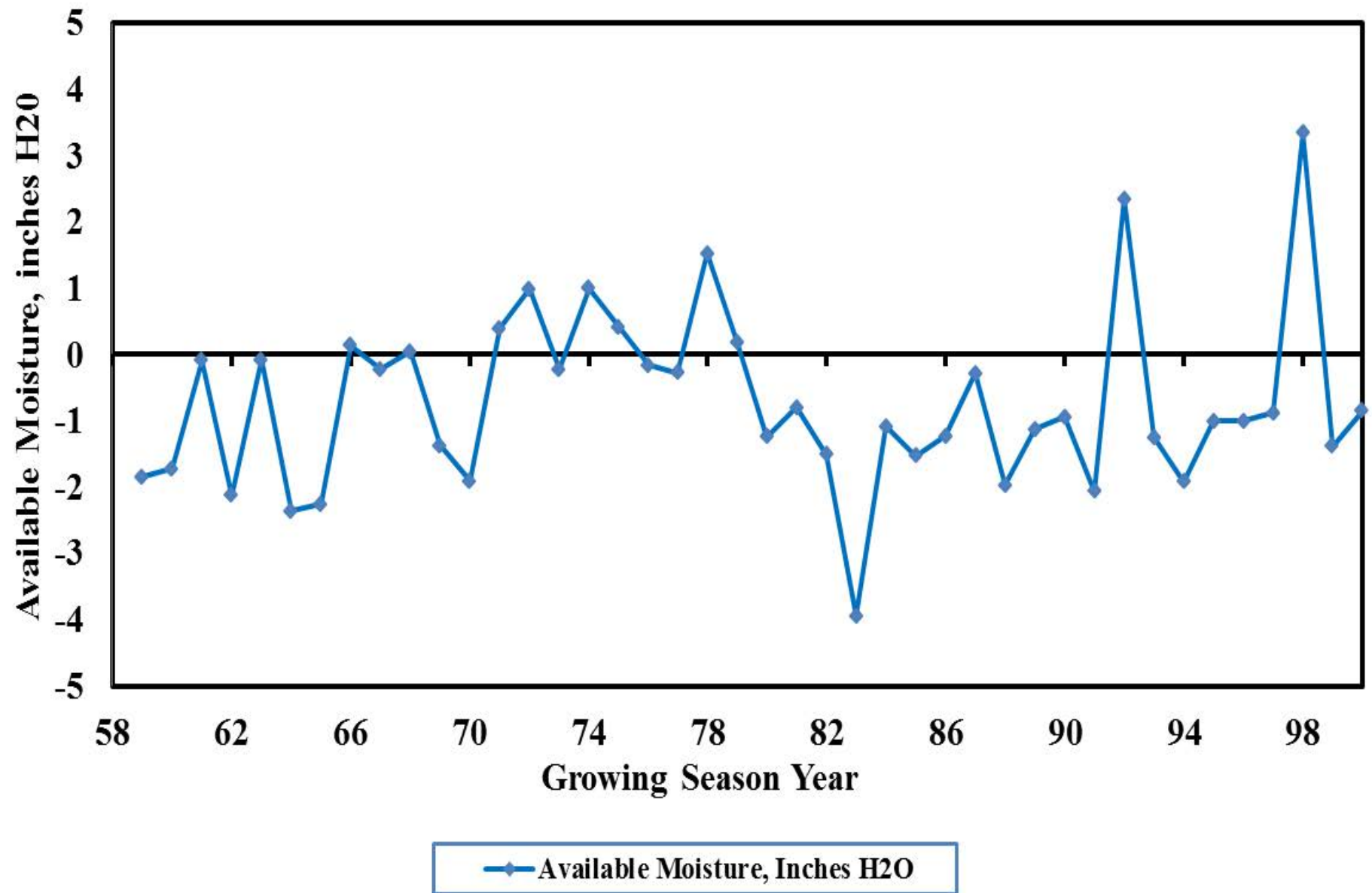
# TWO QUESTIONS CONCERNING CMI

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

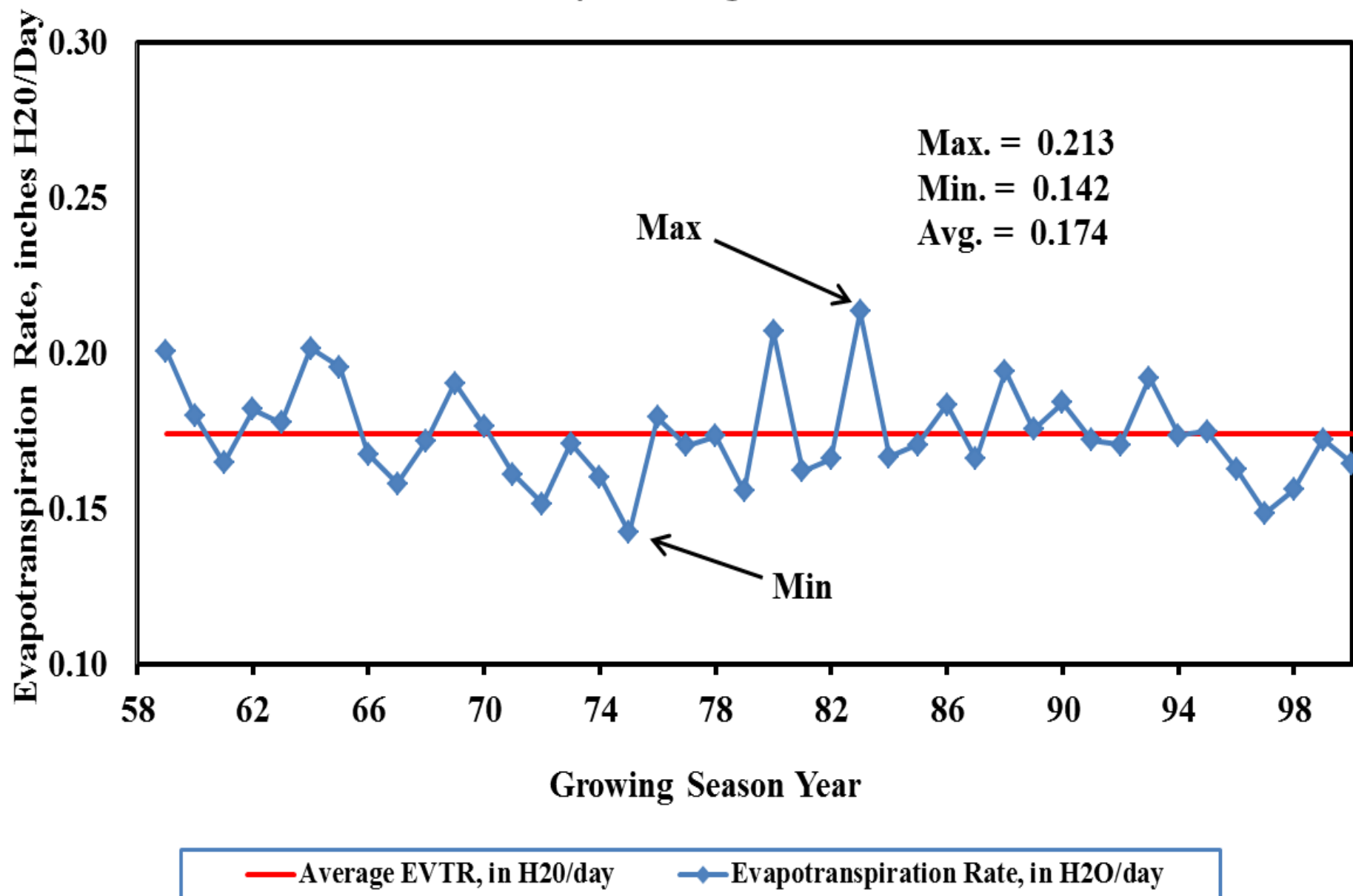
# Available Moisture During CMI

# CMI Available Moisture, Inches of H2O Lexington, 1959-2000



# HOW MUCH MOISTURE IS NEEDED DURING CMI?

## Daily Average Evapotranspiration Rate, Inches H<sub>2</sub>O/Day, Lexington CMI, 1959-2000



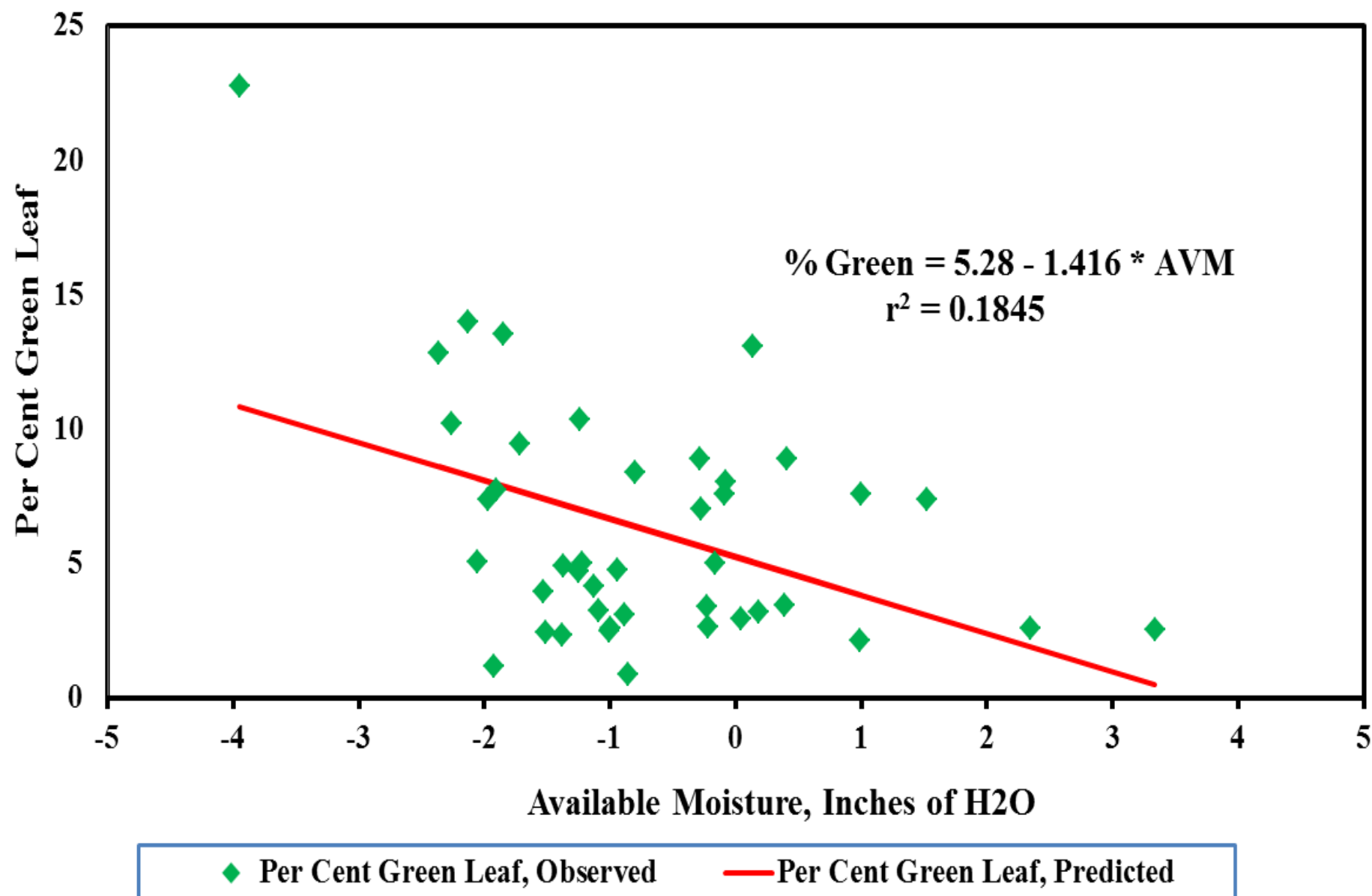
# PLANT MOISTURE REQUIREMENTS FOR CMI

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- Average Evapotranspiration Rate is 0.174 inches/day
- For 25 Day Interval, An Average of 4.35 inches H<sub>2</sub>O Required to Satisfy Plant Needs
- 42 Years – Requirement Ranged from 3.56 to 5.33 inches

# HOW MUCH GREEN COLOR DUE TO DEFICIT?

## Per Cent Green Leaf vs Available Moisture Lexington, 1959 - 2000





# SUMMARY

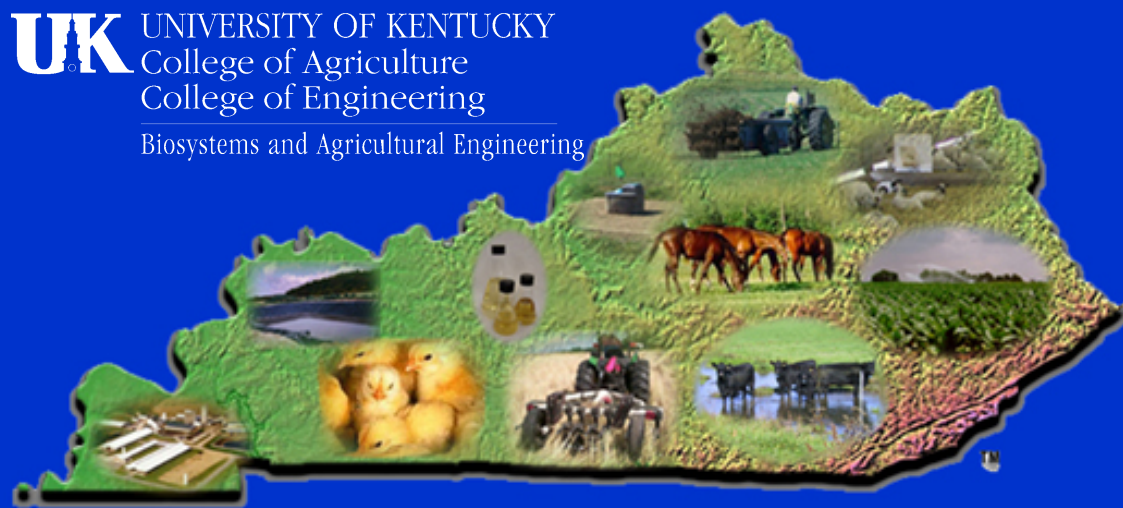
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- For Lexington CMI Plant Was In Moisture Deficit For 32 of 42 Years
- Estimate That Deficit May Be Responsible For Approximately 18 – 20 Per Cent of Green Burley Sold
- For Lexington an Average 4.35 Inches of Moisture Needed During CMI to Avoid a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



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# Soil Water Stress Test on Burley

Phillips, Leggett, Zelenznik and Sutton. 1984

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