

ACT PRESENTATION 2
SOIL COLOR CONTRAST AND
QUANTITY OF
REDOXIMORPHIC FEATURES
OCTOBER 2011



The previous presentation showed you how to properly read the colors. This presentation tells you how to determine the contrast between colors, specifically if the difference is faint, distinct or prominent, as well as the meanings of the differences.

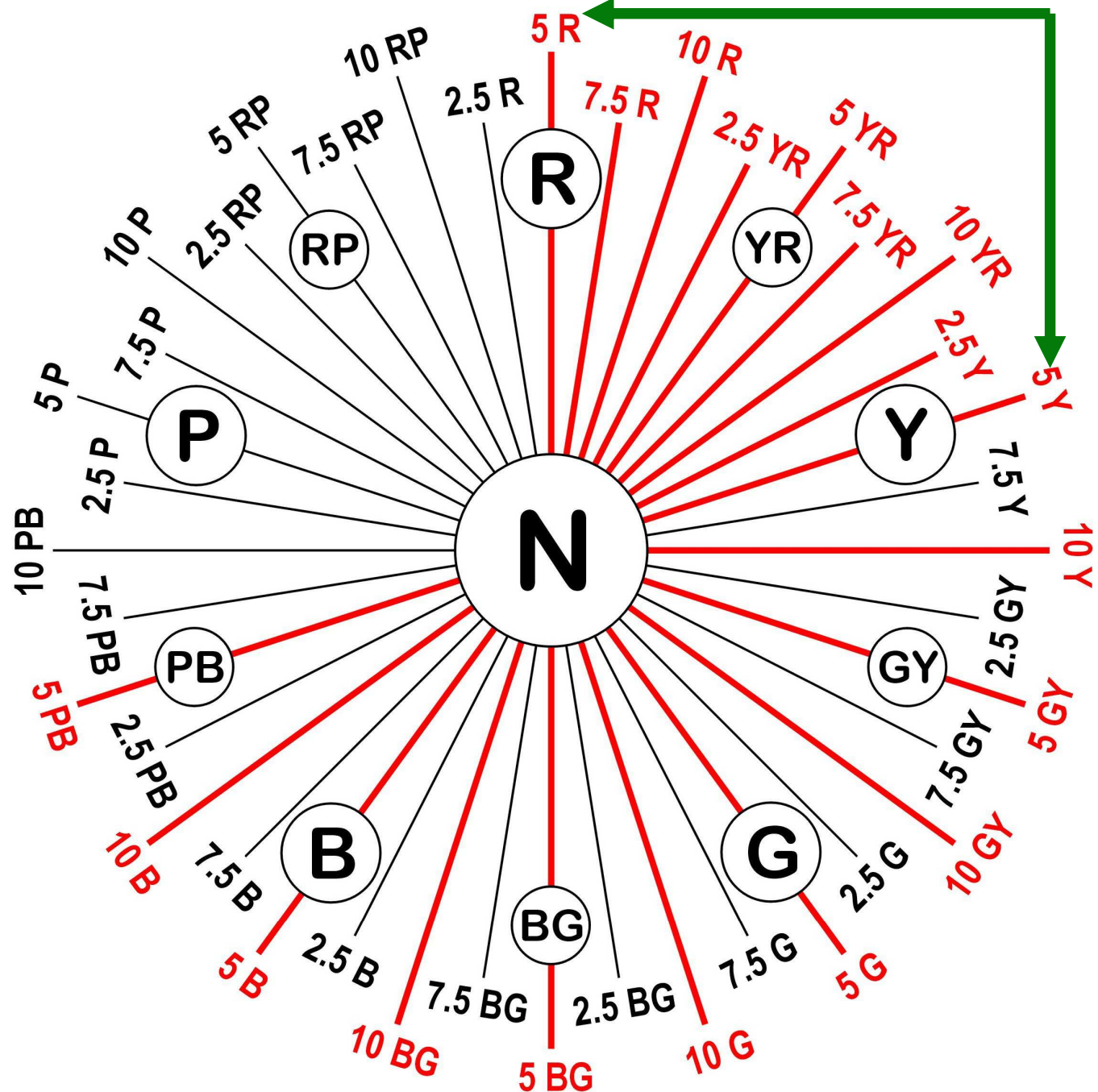
**HOW TO PROPERLY
DETERMINE THE
DIFFERENCE BETWEEN
SOIL COLORS**

First must determine the difference in the HUES of each color

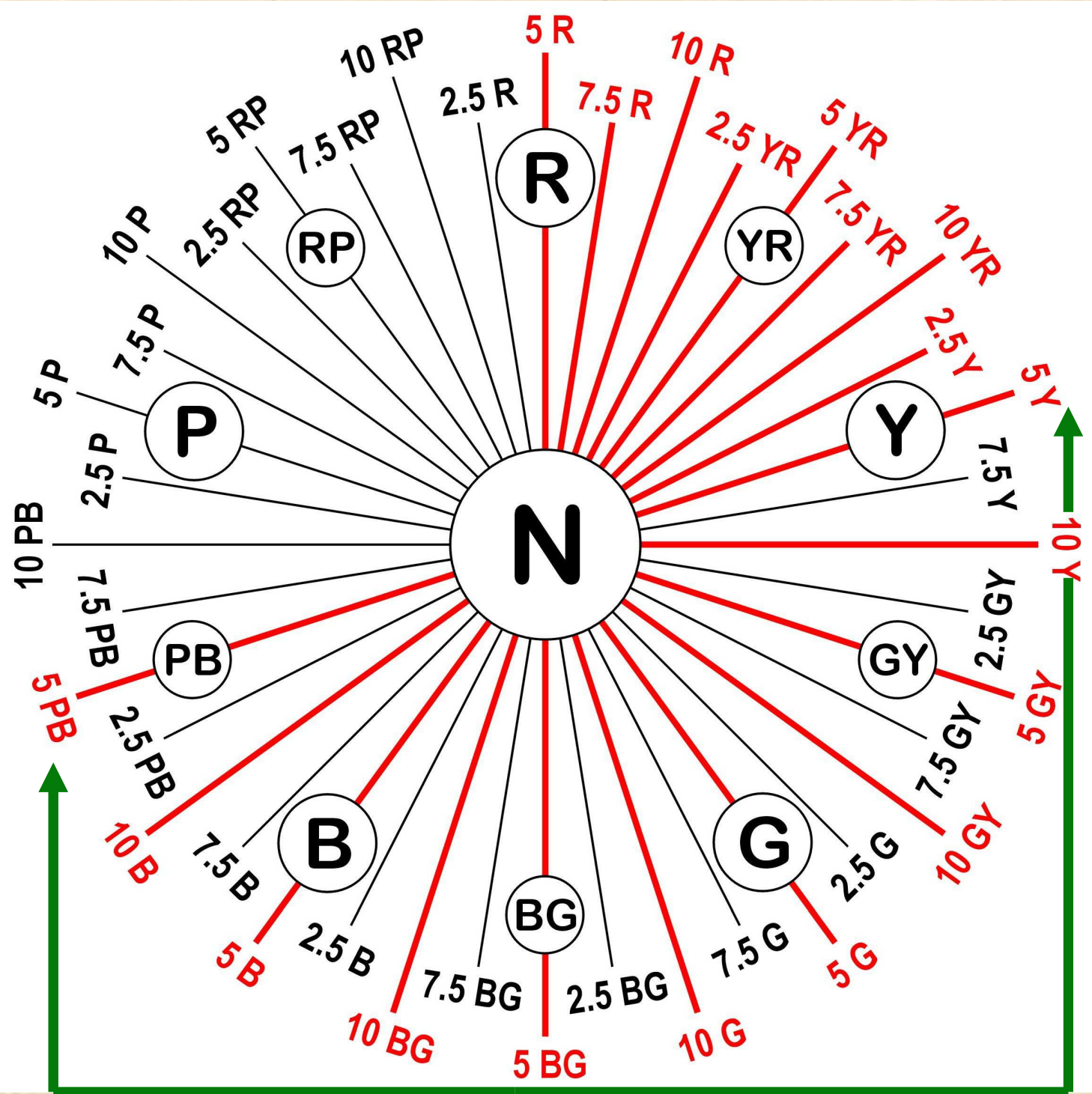
- For this, use the Munsell Hue Circle, which is part of USDA NRCS Technical Note 2, discussed in more detail later in this presentation.**

The hues shown in **RED** are the approved soil hues.

- In a clockwise direction, hues of 5R through 5Y are spaced at single intervals of 2.5 units.
- These hues are “normal soil hues” most used.



- In a clockwise direction, between 5Y and 5PB the interval between approved soil hues is TWO 2.5-unit intervals.



To calculate Hue Change:

- To determine the "difference in hue" between colors, *COUNT THE NUMBER OF 2.5-UNIT INTERVALS.*
- For example, hues of 2.5Y and 7.5YR differ by two 2.5-unit intervals ($7.5 - 2.5 = 5$, which is two 2.5 unit intervals), and so their difference in hue is counted as "2."
- Hues of 5Y and 5GY differ by four 2.5-unit intervals, and so their difference in hue is counted as "4."
- Could also just use the wheel.

Hue change from Neutral

- *The Hue change from NEUTRAL to ANY OTHER HUE is a change of ONE UNIT OF HUE.*

Units of Value Change

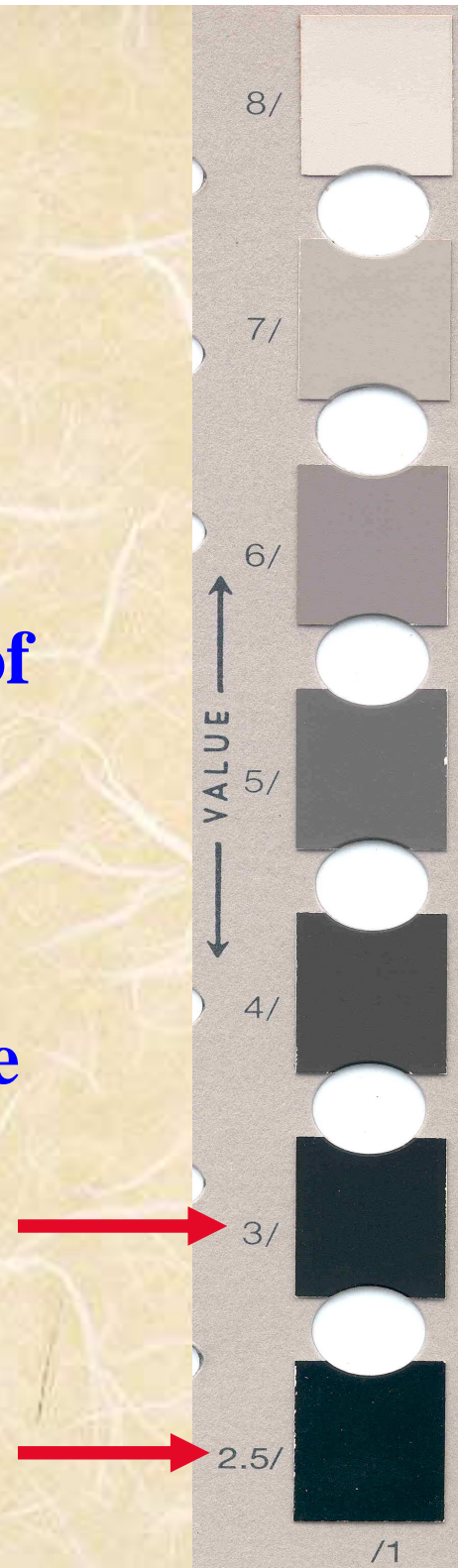
- Units of value range from 0 to 10. Normally, there is a one unit change between each color, but there may be less.

- For example:

The difference in **Value** between a 10YR **5/1** and a 10YR **7/1** is 2 UNITS. (The difference between 5 and 7 is 2.)

The difference in **Value** between a 7.5YR **2.5/1** and a 7.5YR **3/1** is 0.5 UNITS (3-2.5=0.5, or <1 unit of value change)

- Here, the values can change as little as 0.5 units within the same chroma.
- The difference between a value of 2.5 and a value of 3 (both at chroma 1) is 0.5 units. If you were to count chips, the answer would be different, where the wrong answer would be a difference of 1 chip.



VERY
IMPORTANT!!!

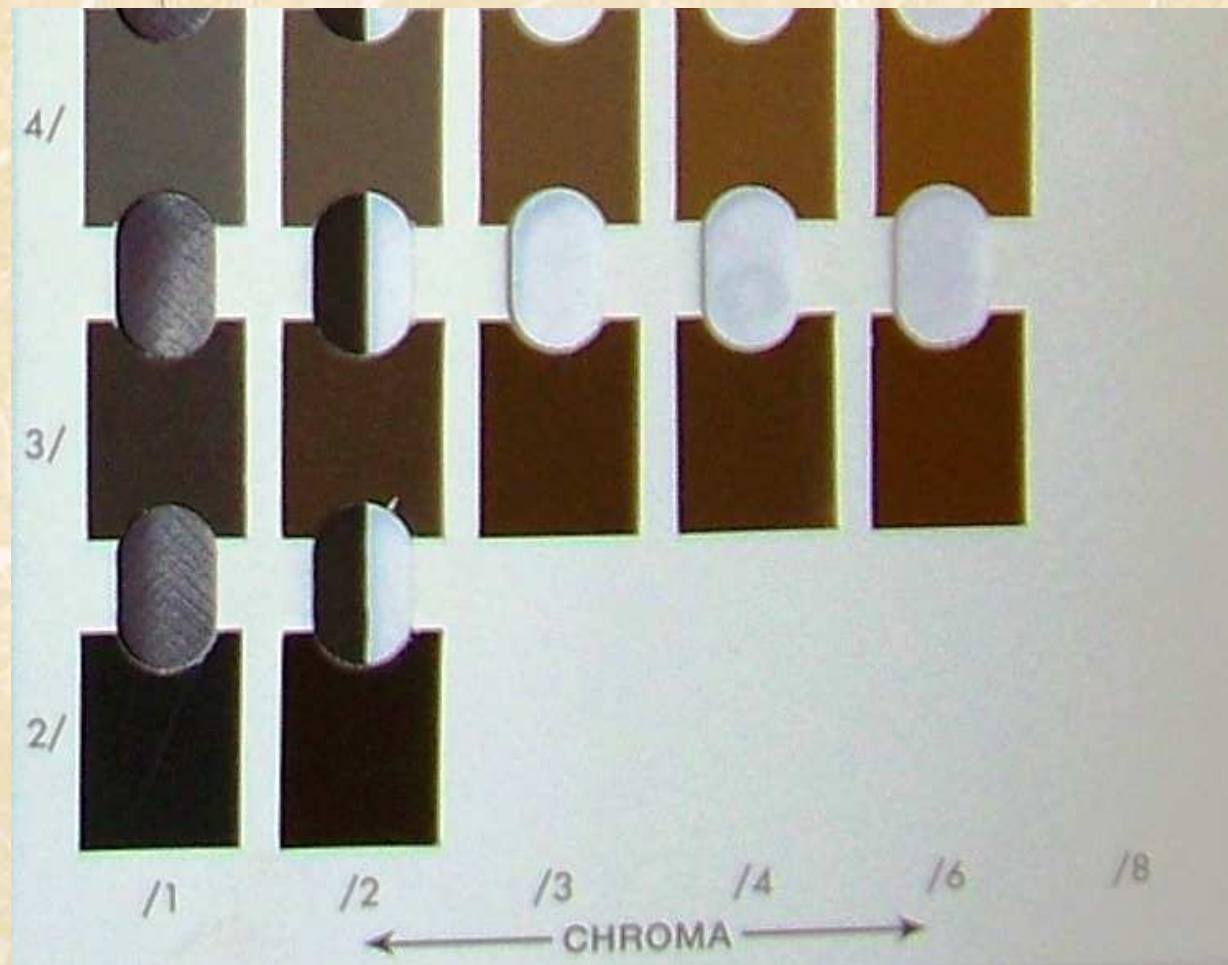
- **TO DETERMINE VALUE**
CHANGE, CALCULATE
DIFFERENCE BETWEEN THE
UNITS

(Value of 2.5, 3, 4, etc.) –

DO NOT COUNT CHIPS !!

Units of Chroma Change

- Units for Chroma range from 0 to 8. There is a one or two unit change between each color.



VERY
IMPORTANT!!!

- **TO DETERMINE CHROMA**
CHANGE, CALCULATE
DIFFERENCE BETWEEN
THE UNITS
(Chroma of 1, 2, 3, 4, etc.) –
DO NOT COUNT CHIPS !!

Units of Chroma Change

- For example:

The difference in **Chroma** between a 10YR 5/1 and a 10YR 5/2 is 1 unit. $(2-1=1)$

The difference in **Chroma** between a 7.5YR 5/3 and a 10YR 5/6 is 3 units $(6-3=3)$.

Note by looking at the hue cards that there is a change of *two chips* but is actually a *change of 3 units of chroma*.

Do not count chips!!!

Note

- When reading values and chromas, *only those units are considered.*
- Change in hue does not affect the calculation of the difference between values or chromas, they are independent of each other.
- Simply determine the value or chroma in each color and calculate the difference without regard to hue.

QUESTIONS???

Contrast between Soil Colors

Contrast refers to the degree of visual distinction between associated colors.

Faint – contrasts that are evident only on close examination.

Distinct -- contrasts that are readily seen but are only moderately expressed

Prominent -- contrasts that are strongly expressed.

QUESTION -

**Can different people
uniformly and consistently
judge these subjective
criteria with no other
guidelines?**

Not very likely!!!!

We need a method by which we can be more objective with our determination. So, we use...

USDA NRCS Soil Survey

Technical Note No. 2

May 2002

Soil Color Contrast

Definitions

This is the
cover page

SOIL SURVEY TECHNICAL NOTE

Soil Survey Technical Note No. 2

Soil Color Contrast

Purpose

This technical note provides uniform definitions for color contrast terms among the *Soil Survey Manual* (Soil Survey Staff, 1993), the *Field Book for Describing and Sampling Soils* (Schoeneberger et al., 1998), and the *Field Indicators of Hydric Soils in the United States* (U.S. Department of Agriculture, 1998). It also describes a new procedure to determine the difference in hue between colors.

Background

In an effort to synchronize the definition among the *Soil Survey Manual*, the *Field Book for Describing and Sampling Soils*, and the *Field Indicators of Hydric Soils in the United States*, a provisional definition for color contrasts was field tested nationally in 1998. After the testing period, a call for final comments was requested regarding final adoption of the provisional definition. The definition and other items contained in this technical note are the result of these collaborations and deliberations.

Introduction

Color contrast is the degree of visual distinction that is evident between one soil color compared with another in close proximity. In this application it is a visual impression of the prominence between a minor color component (mottle or concentration) and an associated major color component (matrix). The *Soil Survey Manual* provides three categories of soil color contrast:

- 1) *faint* for contrasts that are evident only on close examination,
- 2) *distinct* for contrasts that are readily seen but are only moderately expressed, and
- 3) *prominent* for contrasts that are strongly expressed.

This technical note provides guidelines to help the soil scientist assign contrast terms consistently. Determining soil color contrast is not always simple. Prominent mottles are likely the first thing one notices when observing a freshly broken piece of soil fabric. However, if a fabric has several shades and less contrast, it takes time and concentration to fully record colors and color patterns. The contrast between two colors decreases with decreasing value and/or chroma, and it becomes faint if value is 3 or less and chroma is 2 or less, regardless of differences in hue. Furthermore, there can be a considerable amount of error in distinguishing and contrasting the colors of two features, depending on the water state; the quality of light; the time of day; roughness

Definitions of soil color contrast terms

Note: If the mottle and matrix both have **values** of ≤ 3 and **chromas** of ≤ 2 , the color contrast is ***Faint***, **regardless of the difference in hue.**

Faint - Evident only on close examination. The contrast is faint if the:

- 1) difference in hue = 0, difference in value is ≤ 2 , and difference in chroma is ≤ 1 , or
- 2) difference in hue = 1, difference in value is ≤ 1 , and difference in chroma is ≤ 1 , or
- 3) difference in hue = 2, difference in value = 0, and difference in chroma = 0, or
- 4) difference in hue is ≥ 3 and both colors have values of ≤ 3 and chromas of ≤ 2 .

Distinct - Readily seen but contrast only moderately with the color to which compared. The contrast is distinct if the:

- 1) difference in hue = 0, and
 - a. difference in value is ≤ 2 and difference in chroma is >1 to <4 , or
 - b. difference in value is >2 to <4 and difference in chroma is <4 .
- 2) difference in hue = 1, and
 - a. difference in value is ≤ 1 and difference in chroma is >1 to <3 , or
 - b. difference in value is >1 to <3 , and difference in chroma is <3 .
- 3) difference in hue = 2, and
 - a. difference in value = 0 and difference in chroma is >0 to <2 , or
 - b. difference in value is >0 to <2 and difference in chroma is <2 .

Prominent - Contrasts strongly with the color to which compared. Color contrasts that are not faint or distinct are prominent.

In the following slides, the symbol “ Δ ”(delta) means “change or difference in”. For example: $\Delta h=1$ means the change of hue between the two colors is one 2.5 unit interval.

Example 7.5YR TO 10YR

Use the method given in the technical note to determine hue difference.

IMPORTANT NOTE!!!

***If the mottle and matrix
both have values of ≤ 3 and
chromas of ≤ 2 , the color
contrast is faint,
REGARDLESS OF THE
DIFFERENCE IN HUE.***

Table 1 - Tabular key for contrast determination using Munsell® notation

Note: If both colors have values of ≤ 3 and chromas of ≤ 2 , the color contrast is *Faint* (regardless of the difference in hue).

<i>Hues are the same ($\Delta h = 0$)</i>			<i>Hues differ by 2 ($\Delta h = 2$)</i>		
Δ Value	Δ Chroma	Contrast	Δ Value	Δ Chroma	Contrast
0	≤ 1	Faint	0	0	Faint
0	2	Distinct	0	1	Distinct
0	3	Distinct	0	≥ 2	Prominent
0	≥ 4	Prominent	1	≤ 1	Distinct
1	≤ 1	Faint	1	≥ 2	Prominent
1	2	Distinct	≥ 2	---	Prominent
1	3	Distinct			
1	≥ 4	Prominent			
≤ 2	≤ 1	Faint			
≤ 2	2	Distinct			
≤ 2	3	Distinct			
≤ 2	≥ 4	Prominent			
3	≤ 1	Distinct			
3	2	Distinct			
3	3	Distinct			
3	≥ 4	Prominent			
≥ 4	---	Prominent			
<i>Hues differ by 1 ($\Delta h = 1$)</i>			<i>Hues differ by 3 or more ($\Delta h \geq 3$)</i>		
Δ Value	Δ Chroma	Contrast	Δ Value	Δ Chroma	Contrast
0	≤ 1	Faint	Color contrast is prominent, except for low chroma and value.		Prominent
0	2	Distinct			
0	≥ 3	Prominent			
1	≤ 1	Faint			
1	2	Distinct			
1	≥ 3	Prominent			
2	≤ 1	Distinct			
2	2	Distinct			
2	≥ 3	Prominent			
≥ 3	---	Prominent			

- $\Delta h = 0$:
- 3 Faint
- 9 Distinct
- 5 Prominent
(Note that a Δ value or Δ chroma ≥ 4 is prominent)

Hues are the same ($\Delta h = 0$)

Δ Value	Δ Chroma	Contrast
0	≤ 1	Faint
0	2	Distinct
0	3	Distinct
0	≥ 4	Prominent
1	≤ 1	Faint
1	2	Distinct
1	3	Distinct
1	≥ 4	Prominent
≤ 2	≤ 1	Faint
≤ 2	2	Distinct
≤ 2	3	Distinct
≤ 2	≥ 4	Prominent
3	≤ 1	Distinct
3	2	Distinct
3	3	Distinct
3	≥ 4	Prominent
≥ 4	---	Prominent

- $\Delta h = 1$
 - 2 Faint
 - 4 Distinct
 - 4 Prominent
- (Note that a Δ value or Δ chroma ≥ 3 is prominent)

<i>Hues differ by 1 ($\Delta h = 1$)</i>		
Δ Value	Δ Chroma	Contrast
0	≤ 1	Faint
0	2	Distinct
0	≥ 3	Prominent
1	≤ 1	Faint
1	2	Distinct
1	≥ 3	Prominent
2	≤ 1	Distinct
2	2	Distinct
2	≥ 3	Prominent
≥ 3	---	Prominent

Hues differ by 2 ($\Delta h = 2$)

Δ Value	Δ Chroma	Contrast
0	0	Faint
0	1	Distinct
0	≥ 2	Prominent
1	≤ 1	Distinct
1	≥ 2	Prominent
≥ 2	---	Prominent

- $\Delta h = 2$
- 1 Faint
- 2 Distinct
- 3 Prominent
(Note that a Δ value or Δ chroma ≥ 2 is prominent)

<i>Hues differ by 3 or more ($\Delta h \geq 3$)</i>		
Δ Value	Δ Chroma	Contrast
Color contrast is prominent, except for low chroma and value.		Prominent

$\Delta h = 3$

All color contrast is prominent by definition -

EXCEPT FOR THOSE VALUES ≤ 3
AND CHROMAS ≤ 2 , WHICH ARE
FAINT BY DEFINITION
REGARDLESS OF HUE CHANGE

Volume of Redoximorphic Features

**Or: Few, Common or Many
Redox Features?**

- The quantity (*volume*) of the redoximorphic features in the soil sample is important in the determination of the estimated seasonal high water tables.
- **NOTE:** Hydric soils can have *vastly different* requirements than non-hydric soils. More on this later.

Non-hydric soils

- Redoximorphic features must be at least **COMMON**, but can also be **MANY**.
- They **CANNOT** be **FEW**.
- So, what is the required volume redox features must occupy to count as “common” or “many”?

Quantity of Redoximorphic Features *(few, common, many)*

- The following amounts correlate with specific percentages:
- Few -- less than 2% (<2%)
- Common -- 2 to 20% (2-20%)
- Many -- more than 20% (>20%)

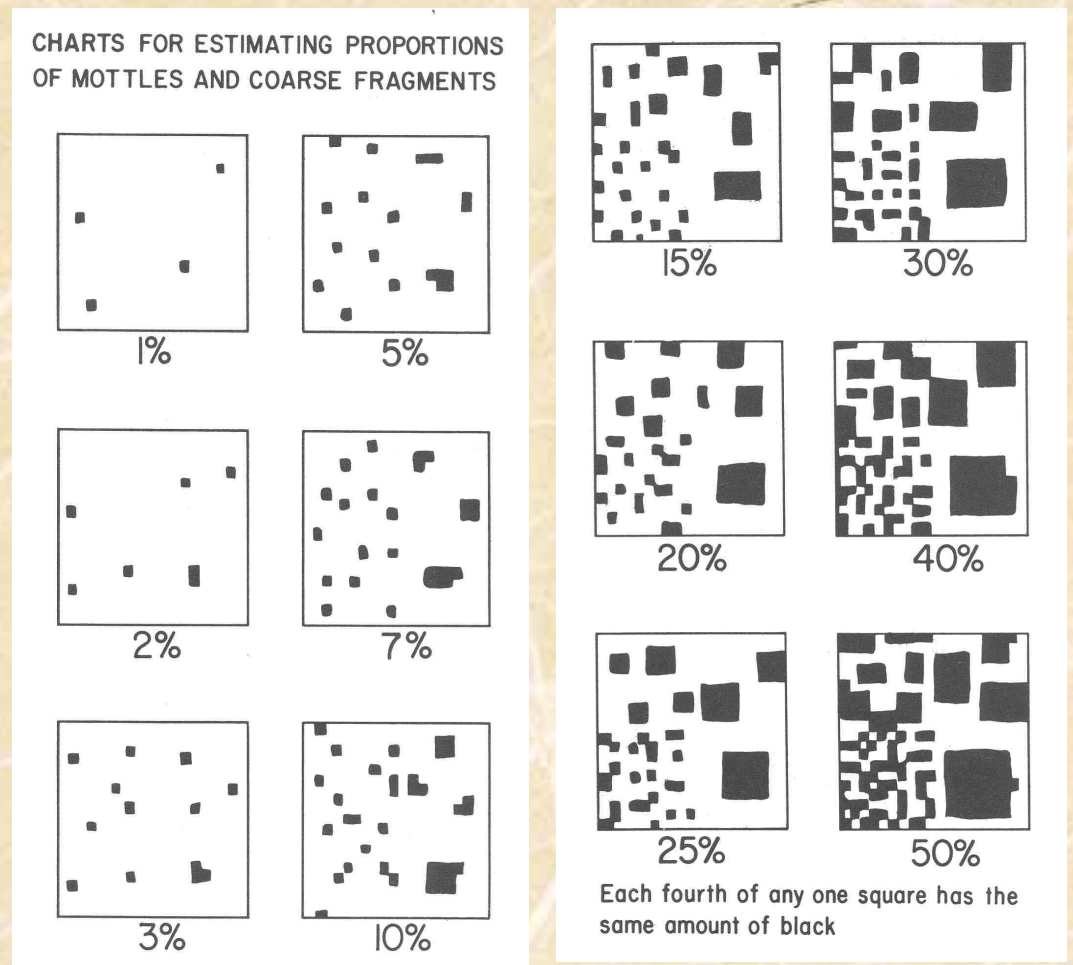
Determination of the quantity of Redox Features

- Use the “**Charts for Estimating Proportions of Mottles and Coarse Fragments**” found in the **Munsell Soil Color Charts**. These will quantify the amount of redox features.

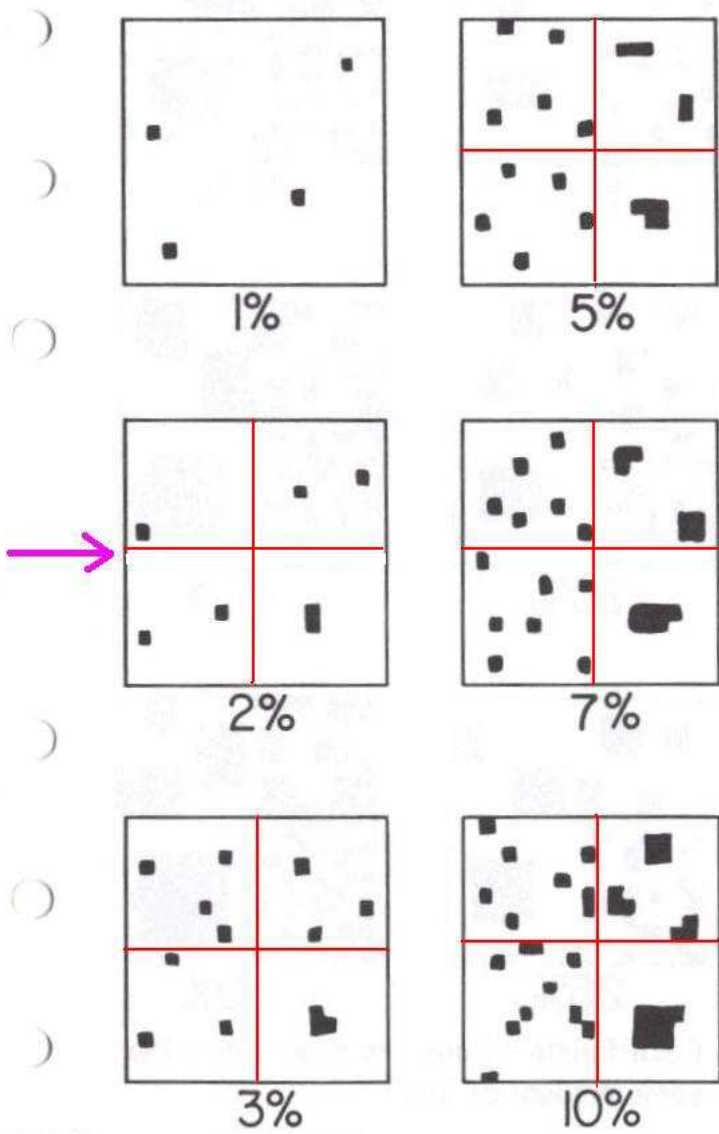
Abundance and Size of Color Contrasting Areas

- **Size of mottles**
Fine -- < 5 mm
Medium -- 5 to 15 mm
Coarse -- > 15 mm
- *Note that the size of the mottles do not matter, only the amount.*

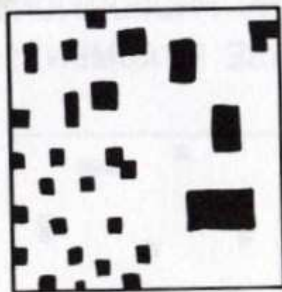
Abundance has
SPECIFIC meaning
for Hydric Soils



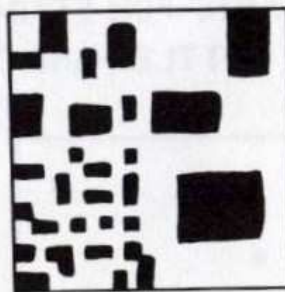
CHARTS FOR ESTIMATING PROPORTIONS OF MOTTLES AND COARSE FRAGMENTS



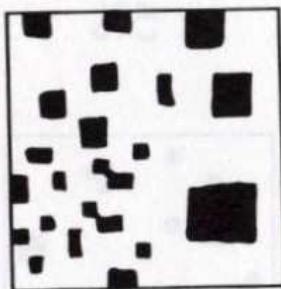
EACH FOURTH OF ANY ONE SQUARE HAS THE SAME AMOUNT OF BLACK



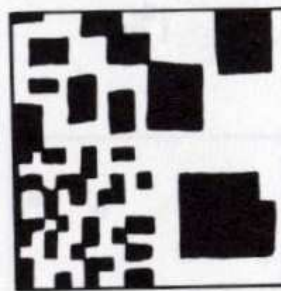
15%



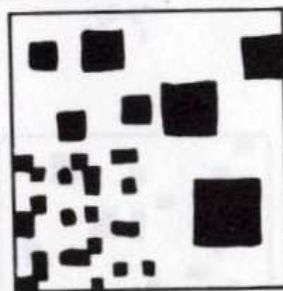
30%



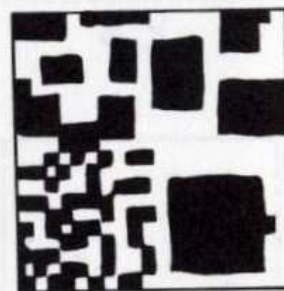
20%



40%



25%



50%

Each fourth of any one square has the same amount of black

Hydric soils and abundance of features

- Often the indicators in hydric soils must meet a higher standard than non-hydric soils. Some features for indicators must be 100%, while others must be 10% or 70%.
- Watch for this in the Hydric Soils Presentation.

QUESTIONS???

End of Presentation