

## APPENDIX V

CLIMATIC GROUPS OF RAW SOILS

For several years the Project Committees on Erosion Control and Plant Ecology and on Cooperative Agreement Project Analyses have felt the need for some simple grouping of soils into broad regions, so that such a classification could serve as a basis for segregating and comparing erosion control practices and results from the various States according to varying conditions of soil and climate.

It is obvious that the thousands of soil series and types could not be used as the basis of regional summaries. Likewise the broad "soil associations" described by the U. S. Department of Agriculture would still give too many divisions. Temperature and precipitation averages alone would not give an accurate enough division.

The committees present an outline of a preliminary classification developed by Mr. D. W. Levandowsky, a member of the Project Committee on Erosion Control and Plant Ecology. This classification of "Climatic Groups of Raw-Soils" is based on Horizon C soils which are products of climatic weathering of parent material and which have been affected but little if at all by plant life development. There are few occasions in highway construction where A and B horizon soils are not lost as a result of excavation, and even though topsoil is salvaged and replaced on highway slopes, it is seldom that the quantity of topsoil so replaced is sufficient to recreate agricultural field conditions. In other words, the C horizon soils, or raw-soils, form by far the greatest percentage of soil area along highways which must be treated against erosion. Topsoil, when salvaged and replaced, is a part of the treatment against erosion, just as are seed, fertilizer, sod, mulch, etc. Mr. Levandowsky's classification is presented below in more detail.

## A - Dry Climate Raw-Soils

Differences in annual average temperatures are less important in dry climate than they are in humid climates. The weathering of parent material is mostly physical, resulting in a disintegration of parent material into particles resembling a crushing process. Chemical weathering is limited in this case, because of lack of moisture. No leaching of bases takes place, hence these soils do not usually need liming. There is little hydration of silicates, hence formation of clay is limited.

1. Dry Climate Clay Raw-Soil
2. Dry Climate Loamy Raw-Soil
3. Dry Climate Sandy Raw-Soil

## B - Cool-Humid Climate Raw-Soils (Brown Raw-Soils)

Ground remains frozen in cool-humid climate longer than in warm-humid climate, hence weathering is limited in depth. The raw-soils of cool-humid climate are less erodible than the raw-soils of warm-humid climate. However, due to shallow rock strata under cool-humid climate conditions, there is formed the so-called

"clay hard pan" that causes frequent slides. Organic matter content is maintained with less trouble than in warm-humid climate.

1. Cool-Humid Climate Clay Raw-Soil
2. Cool-Humid Climate Loamy Raw-Soil
3. Cool-Humid Climate Sandy Raw-Soil

#### C - Warm-Humid Climate Raw-Soils (Red and Yellow Raw-Soils)

Weathering in warm-humid climate is rapid and penetrates deeply into parent rock, forming thick layers of erodible, soft, rotten rock-like material. The bases and plant food elements are leached out to a great extent. The Kaolin type clay is formed. Soil materials are red or yellow as a result of extreme oxidation and hydration of iron. Organic matter when applied is lost quickly.

1. Warm-Humid Climate Clay Raw-Soil
2. Warm-Humid Climate Loamy Raw-Soil
3. Warm-Humid Climate Sandy Raw-Soil

Of course, many exceptions could be noted within each climatic group, and many "transition" areas could be outlined, but at least in the beginning it is thought that a very limited number of divisions should be used. Comments and suggestions are invited by the Committee as to the possibility of developing a simplified working basis of soil and plant relationships.

The principal references used in the preparation of the map (page 70) Climatic Groups of Raw-Soils are as follows:

1. Distribution of the Great Soil Groups, by C. F. Marbut, (Plate 2) Soils of the United States, Part III, Atlas of American Agriculture, U.S.D.A., 1935.
2. Soil Associations of the United States, (Map) U.S.D.A. Yearbook of Agriculture, 1938.
3. Broad Associations of Great Soil Types, (Figure 4) Climate and Soil, by Charles E. Kellogg, p. 278, U.S.D.A. Yearbook of Agriculture, 1941.
4. Climatic Provinces and Plant Growth Regions of the United States, by C. W. Thornthwaite and F. L. Mulford, (Figure 2) Native Woody Plants of the United States, Their Erosion Control and Wildlife Values, U.S.D.A. Misc. Publication No. 303, June, 1938.
5. Climates of the United States, (Maps) pp. 701-747, U.S.D.A. Yearbook of Agriculture, 1941.
6. Distribution of Parent Materials of Soils, by C. F. Marbut, (Plate 4) Soils of the United States, Part III, Atlas of American Agriculture, U.S.D.A., 1935.

Although there are frequent minor exceptions and overlapping, the Climatic Groups of Raw-Soils shown on the map (page 70) include the following Soil Associations as described on the map in the Yearbook of Agriculture, 1938 (Reference 2.)

<u>Dry Climate Raw-Soils</u>	<u>Cool-Humid Climate Raw-Soils</u>	<u>Warm-Humid Climate Raw-Soils</u>
Reddish Prairie Soils	Podzol Soils	Red and Yellow Podzolic Soils
Chernozem Soils	Brown Podzolic Soils	Some of Wiesenboden, Ground
Chestnut Soils	Gray-Brown Podzolic Soils	Water Podzol and Half-Bog
Reddish Chestnut Soils	Prairie Soils	Soils
Brown Soils	Planosols	Some of Lithosols and Shallow
Reddish Brown Soils	Some of Wiesenboden, Ground	Soils (Humid)
Noncalci Brown Soils	Water Podzol and Half-Bog	
Gray Desert Soils	Soils	
Red Desert Soils	Some of Lithosols and Shallow	
Rendzina Soils	Soils (Humid)	
Solonchak and Solonetz		
Soils		
Lithosols and Shallow		
Soils (Arid-subhumid)		
Lithosols (Relatively		
sparse vegetation)		
Sands (Dry)		

The climatic characteristics of the Climatic Groups of Raw-Soils shown are approximately as follows:

#### CLIMATIC RAW-SOILS

Characteristics	: Dry Climate :	Cool-Humid Climate :	Warm-Humid Climate
Annual Average Precipitation	Less than 25 inches	More than 25 inches	More than 25 inches
Average Precipitation for 10 driest years in 40 years	Less than 20 inches	More than 20 inches	More than 20 inches
Percentage of years with less than 15 in. of precipitation	More than 10 per cent	Less than 10 per cent (Mostly no years with less than 15 inches)	Less than 10 per cent (Mostly no years with less than 15 inches)
Average Annual Temperature		Less than 60 degrees F.	More than 55 degrees F.
Average January Temperature		Less than 35 degrees F.	More than 30 degrees F.

CLIMATIC GROUPS OF RAW SOILS

