Some Characteristics of Saline and Alkali Soils in Gem County, Idaho

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A soil survey of Gem County was initiated in 1940 and conducted cooperatively by the Idaho Agricultural Experiment Station and the Division of Soil Survey, B.P.I.S.A.E. Barren spots and stunted or poor plant growth are very much in evidence on many of the soils of the area. Therefore, samples were collected during the soil survey for the preparation of an "alkali" map, a soil classification based principally upon soluble salt content. The data disclosed that most of the locations with poor plant growth or no growth at all were relatively low in soluble salts, and so a classification based upon this criterion was not satisfactory. In 1947, the U.S. Regional Salinity Laboratory, Bureau of Plant Industry, Soils, and Agricultural Engineering, cooperated with the aforementioned agencies in studies relating to the characterization of the saline and alkali soils of the area with special reference to criteria for alkali appraisal, i.e., selection of tests and methods which could be used as a basis for mapping alkali soils in this and similar areas. This report presents some of the data obtained by the Salinity Laboratory in the investigations.

DESCRIPTION OF AREA

Gem County, located in southwestern Idaho, has an area of 567 square miles, about 30 square miles of which are farmed under irrigation. The principal irrigated area is in the Payette River Valley and extends from a few miles east of the town of Emmett westward to the county line. The Valley is 4 to 6 miles wide and rises gently southward away from the river to a low range of hills with steep footslopes. North of the Payette River is an abrupt escarpment which forms the southern border of extensive gently rolling river terraces. The terraces were formed of old river transported material probably mixed with some material from the adjoining uplands of the Payette formation, whereas the bottomlands south of the river are derived from more recent mixed transported materials. The principal saline and alkali soils of the area are the Letha, Reed, Moulton, Wardwell, and Power soil series. They were developed from transported materials and have profiles ranging from some material from the adjoining uplands of the Payette formation, whereas the bottomlands south of the river are derived from more recent mixed transported materials. The principal saline and alkali soils of the area are the Letha, Reed, Moulton, Wardwell, and Power soil series. They were developed from transported materials and have profiles ranging from tailed studies were made at two locations to determine the determination of the requirements and feasibility of a mobile field unit for diagnosing saline and alkali soil conditions.

OBJECTIVES

Samples collected by the Division of Soil Survey during the course of the survey made in 1940 showed that only a small proportion of the barren spots and areas of poor or stunted plant growth had excessive salt accumulation while a majority of them gave a pink or red color with phenolphthalein indicator. Since most of the saline and/or alkali areas did not contain harmful amounts of salt, proper appraisal of the existing problems required that additional information regarding the chemical and physical characteristics of the soils be collected. The objectives of these studies were:

1. The characterization of saline, alkali, and drainage conditions in the area.
2. The investigation of survey tests and methods which could be used as a basis for mapping similar conditions in this and other areas.
3. The determination of the requirements and feasibility of a mobile field unit for diagnosing saline and alkali soil conditions.

PLAN OF INVESTIGATION

The investigation consisted of:

1. Drainage and ground water investigations.
2. Analysis of soil samples with field laboratory equipment.
3. Collection of large "master" soil samples for analysis in the Laboratory.
4. Determination of field infiltration rates at selected sites.
5. Detailed chemical and physical analyses of master samples.

RESULTS

Piezometers were installed at several locations to measure the position of the water table, while detailed studies were made at two locations to determine ground-water flow patterns. A coarse river gravel, which provides free lateral movement of ground waters, underlies much of the area. Where deep open drains intersect these strata, drainage is adequate. However, the water table was encountered at a depth of 3 to 6 feet over the major portion of the problem area.

Field laboratory tests were carried out on 39 soil samples from 10 sampling sites. These tests were: (a) resistance of the saturated soil paste, (b) pH of the saturated paste, (c) pH of 1:10 soil-water suspension, (d) conductivity of the saturation extract, and (e) soluble-sodium-percentage, quick method. In addition, field infiltration was determined at several sites. The field tests aided in the collection of the master samples. They also indicated that the problem soils of the area

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1 Contribution from the U.S. Regional Salinity & Rubidoux Laboratories, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U.S. Dept. of Agriculture, Riverside, Calif., in cooperation with the 11 western states and the Territory of Hawaii.
2 Soil Scientist and Irrigation Engineer, respectively.
3 These recently have been recommended for correlation as the Bramwell and Vanderdasson series, respectively.