

UNITED STATES DEPARTMENT OF AGRICULTURE

Soil Survey
of
The Deming Area, New Mexico

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In Cooperation with the New Mexico Agricultural Experiment Station

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SOIL SURVEY OF THE DEMING AREA, NEW MEXICO

BY A. T. SWEET, in Charge, and E. N. POULSON

AREA SURVEYED

The Deming area comprises 276 square miles or 176,640 acres in the vicinity of Deming, near the center of Luna County in southwestern New Mexico. Deming lies about 80 miles northwest of El Paso, Tex., and about 45 miles southeast of Silver City.

The region as a whole is a broad eastward-sloping desert plain. In elevation it ranges from about 4,000 feet above sea level where it rises from the Rio Grande Valley on the east to 6,000 feet along the Continental Divide at the west, a rise of between 15 and 20 feet to the mile. That part included in the Deming area ranges from slightly more than 4,100 feet in the southeastern part to approximately 4,400 feet in the northwestern part.

Rising from the floor of this broad plain and nearly surrounding the surveyed area are narrow but steep and rugged mountain ridges and lower isolated peaks and ranges of hills. Within the area Red Mountain rises to an elevation of more than 1,000 feet above the plain and Black Mountain, a short distance north of the area, is almost as high. South of Red Mountain is a chain of low rocky hills, the Snake Hills, and southeast of these are a few low isolated knobs or hillocks. The White Hills, on the westward slope of the Florida Mountains, are similar to the Snake Hills.

Except for small low ridges of alluvial origin and small mounds and hummocks, largely of wind-blown material, the land surface is smooth, with a nearly uniform slope to the south and southeast. Low ridges, from 3 to 8 feet high, consisting mainly of sandy and gravelly material apparently deposited along the edges of old stream channels, extend for long distances in a general northwest-southeast direction across the area. In many places along the lee side of fields which have been under cultivation, along old fence lines, and in broad areas around clumps of mesquite bushes wind-blown material has accumulated, forming hummocks from 3 to 10 feet high and making the land so uneven as to be of no agricultural value.

Toward the mountains the floor of the plain rises with a gradual but uniform slope of 100 or more feet to the mile. These slopes have been built up from material carried down from the mountains by small streams and deposited in smooth overlapping outwash fans in which there is no indication of even slight terracing.

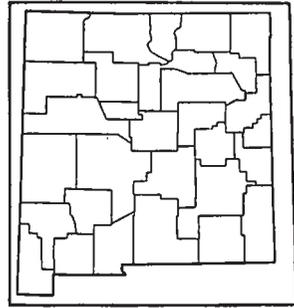


FIGURE 1.—Sketch map showing location of the Deming area, New Mexico

DRAINAGE, IRRIGATION, AND ALKALI

Probably Mimbres River at one time carried a much greater volume of water than at present and flowed west of the Florida Mountains, passing between the south end of this range and the Tres Hermanas Mountains. This course is indicated by the broad stretch of soil formed from old alluvial material; by low ridges of waterworn gravel which have a general north-south or northwest-southeast trend; by alternate beds of stream gravel found below the surface in practically all wells of the region; and by the zone of shallow water depth shown in Figure 2 on page 16.

Gradually the river built up the floor of the valley by its deposits until it was compelled to seek a new outlet toward the lower part of the area to the east. Overflow passed north of the Little Florida Mountains, and a channel was established. During periods of unusual precipitation, Mimbres River now follows a well-defined channel northeast of the Little Florida Mountains. Overflow has at times extended far to the south of this channel, however.

Palomas Arroyo crosses the extreme southwestern part of the area surveyed. Between the small channel of this stream and Mimbres River there are no well-defined stream channels, the water from occasional rains following roadside ditches or spreading over the surface until it is absorbed or evaporates. Numerous small arroyos at times carry considerable water out into the plains, but these, like Mimbres River and Palomas Arroyo, are dry except for a very short time following rainfall. In many places, though exceedingly dry and fairly sandy, the land does not absorb moisture readily but forms a hard smooth crust or playa on which the water may stand for several days before evaporating or being absorbed.

Under present conditions of deficient water supply, artificial drainage of lands under cultivation is not needed.

Water for irrigation is pumped from wells in which the lift is from 20 to more than 70 feet. The supply comes from gravel beds underlying parts of the area and is seepage from Mimbres River and its tributaries. The amount obtainable from this source is not known. Probably little water used in irrigation returns to the underground supply. Irrigation by pumping has some advantages. The water is free from weed seed and other contaminations and can be had whenever needed. These advantages are much more than offset, however, by the cost.

Although alkali, largely in the form of sodium sulphate, is present in small amounts in areas now under cultivation and in those likely to be brought under cultivation it is of little importance as a toxic agent limiting or retarding plant growth. The possibility of the rise and accumulation of alkali through the rise of the water table is very slight.

CLIMATE

In the Deming area the mean annual precipitation is 9.53 inches. In a region of high temperature and strong dry winds, such as this, it is impossible to grow successfully even the more drought-resistant crops by dry-farming methods alone. On the surrounding mountains the rainfall is doubtless considerably more than at Deming on the nearly level plain, and although the moisture is usually taken up by the soil or evaporated by the dry, hot air before it reaches

the lower levels it is of value in increasing forage growth on the lower slopes and alluvial fans.

The average date of the last killing frost is March 26 and of the first is October 30, giving an average frost-free season of 218 days. Killing frosts have, however, occurred as late as April 27 and as early as October 9. The frost-free season is sufficiently long to allow the successful growing of cotton and other crops requiring long seasons. Crops at a high altitude, where the air is rare and the percentage of fair weather high, as in this area, develop more rapidly and mature more quickly than under more humid weather conditions and less intense sunshine.

Strong winds are prevalent, especially during early spring, sometimes causing more or less damage to soils and crops.

Table 1, based on records of the United States Weather Bureau, shows the normal monthly, seasonal, and annual temperature and precipitation at Deming for a period of years.

[Elevation, 4,325 feet]

TABLE 1.—Normal monthly, seasonal, and annual temperature and precipitation at Deming, N. Mex.

[Elevation, 4,325 feet]

| Month | Temperature | | | Precipitation | | | |
|----------------|-------------|------------------|------------------|---------------|---|--|---------------------|
| | Mean | Absolute maximum | Absolute minimum | Mean | Total amount for the driest year (1924) | Total amount for the wettest year (1870) | Snow, average depth |
| | ° F. | ° F. | ° F. | Inches | Inches | Inches | Inches |
| December..... | 42.0 | 82 | 0 | 0.61 | 0.22 | 2.00 | 1.2 |
| January..... | 42.8 | 84 | -7 | .46 | (¹) | (¹) | .8 |
| February..... | 46.2 | 83 | 10 | .45 | .15 | .06 | 1.0 |
| Winter..... | 43.7 | 84 | -7 | 1.52 | .37 | 2.06 | 3.0 |
| March..... | 51.3 | 91 | 12 | .51 | .22 | .26 | .7 |
| April..... | 57.1 | 99 | 24 | .20 | .13 | (¹) | (¹) |
| May..... | 65.8 | 100 | 32 | .21 | .03 | .00 | 0 |
| Spring..... | 58.1 | 100 | 12 | .92 | .38 | .26 | .7 |
| June..... | 76.2 | 109 | 38 | .55 | (¹) | 1.99 | 0 |
| July..... | 78.8 | 110 | 48 | 2.07 | 2.20 | 6.50 | 0 |
| August..... | 77.2 | 109 | 50 | 1.96 | .41 | 8.99 | 0 |
| Summer..... | 77.4 | 110 | 38 | 4.58 | 2.61 | 17.48 | 0 |
| September..... | 71.7 | 104 | 38 | 1.28 | (¹) | .44 | 0 |
| October..... | 61.2 | 95 | 18 | .73 | (¹) | .12 | 0 |
| November..... | 49.8 | 92 | 6 | .50 | .02 | .00 | .3 |
| Fall..... | 60.9 | 104 | 6 | 2.51 | .02 | .56 | .3 |
| Year..... | 60.0 | 110 | -7 | 9.53 | 3.38 | 20.36 | 4.0 |

¹ Trace.

SOIL SERIES AND TYPES

In soil classification, soils are divided into large or major groups called series. All the soils of a series are alike in general characteristics except the texture of the surface soil. The series are subdivided, on the basis of differences in the texture of the surface soil, into soil types. Minor variations of soil types are called phases. In the Deming area, 12 soil types and 9 phases, representing 3 soil series, and in addition 2 miscellaneous classes of material, are mapped.

Soils of the Mimbres series range in color from light grayish brown in the lighter-textured types to dark brown or dark grayish brown in the heavier-textured types. They have a light-gray or light brownish-gray silty or fine sandy loam deep substratum underlain by waterworn gravel. No marked accumulation of lime carbonate or caliche occurs within the zone of normal root penetration. These soils have developed from rather recently deposited alluvial material.

Soils of the Mohave series are pronounced reddish brown or dull red in color and have a rough or coarse gritty texture, even in the heavier types. They contain varying amounts of dark-colored gravel of igneous or metamorphic rocks. The subsoils are of deeper or more pronounced reddish color than the surface soils and are compact, sticky, and plastic. The deeper subsoil contains light-colored spots and mottles of lime accumulation which increase in size and number with depth and in places form a soft partly developed lime-carbonate hardpan or caliche. These soils have developed from material washed down from the mountains by small arroyos and spread out in overlapping alluvial fans and on broader nearly level areas.

Soils of the Karro series are light grayish brown, reddish brown, or chocolate brown. Small fragments or nodules of white caliche are on the surface and through the soil, which is underlain at a depth ranging from only a few inches to 36 inches by a thick, highly developed layer of lime-carbonate hardpan or caliche. As a whole these soils are older and have reached a more advanced stage of development than the Mohave soils and a very much more advanced stage than the Mimbres soils.

In addition to soils of the series mentioned, small areas of river wash and rough stony land have been mapped.

Of the three series, soils of the Mimbres group are the most important. The more important of the Mimbres soils are the silty clay loam; silty clay loam, dark-colored phase; silt loam, dark-colored phase; loam; and fine sandy loam, level phase; named in the order of their importance. Other soils are of but slight agricultural importance for crops, under the prevailing conditions of limited supply and high cost of water in the Deming area.

In the following pages of this report the soils are described in full and their agricultural possibilities are discussed; their distribution is shown on the accompanying soil map; and their acreage and proportionate extent are given in Table 2.

TABLE 2.—*Acreage and proportionate extent of the soils mapped in the Deming area, New Mexico*

| Type of soil | Acres | Per cent | Type of soil | Acres | Per cent |
|-------------------------------|---------|----------|---|----------|----------|
| Mimbres silty clay loam | 23, 296 | 20.5 | Mohave loam | 15, 296 | 8.7 |
| Heavy phase | 4, 992 | | Mohave sandy loam | 8, 320 | 4.7 |
| Dark-colored phase | 4, 543 | | Mohave gravelly coarse sandy loam | 13, 632 | 7.7 |
| Heavy-subsoil phase | 3, 392 | | Karro clay loam | 6, 528 | 3.7 |
| Mimbres loam | 11, 392 | 6.4 | Karro loam | 20, 352 | 13.1 |
| Mimbres gravelly loam | 3, 328 | 1.9 | Heavy-subsoil phase | 2, 816 | |
| Mimbres silt loam | 1, 920 | 2.7 | Karro fine sandy loam | 10, 880 | 9.8 |
| Dark-colored phase | 2, 850 | | Shallow phase | 6, 272 | |
| Mimbres fine sandy loam | 20, 416 | 15.5 | River wash | 1, 728 | 1.0 |
| Level phase | 5, 184 | | Rough stony land | 4, 096 | 2.3 |
| Mound phase | 1, 792 | | | | |
| Mohave clay loam | 3, 136 | 2.0 | Total | 176, 040 | |
| Overflow phase | 448 | | | | |

MIMBRES SILTY CLAY LOAM

Mimbres silty clay loam is the dark-brown, heavy-textured soil under cultivation southwest of Deming and in other parts of the Deming area. Under natural or virgin conditions it is dark-brown, slightly reddish dark-brown, or chocolate-brown heavy silty clay loam. Where bare a well-developed but easily broken smooth, fairly hard, thin crust is on the surface. This crust is underlain to a depth of $1\frac{1}{2}$ or 2 inches by a layer of very dark-brown finely granular soil in which the grains are sharp and angular. Below this thin layer of mulch is a layer of dark-brown heavy soil which on drying breaks into rather hard irregular clods from one-half inch to 3 or more inches in diameter. This material is slightly lighter brown in the lower part of the layer, which extends to an average depth of about 18 inches, where it grades into a layer of grayish-brown or gray silty material extending to a depth of about 36 inches. This layer is in general lighter in texture and is mixed with thin layers of fine sand in the lower part. Below the layer of gray silt are fine sand, sand, and waterworn gravel continuous to a depth of 5 or more feet.

When moist, the darker-colored upper part of this soil is very sticky, and if rubbed between thumb and finger it shows a slick shiny surface. The gray layer, when dry, is powdery and flourlike and when wet is less sticky than the dark surface soil. If rubbed between thumb and finger when moist it shows a roughened or velvety surface. When dry, the clods are easily broken. The soil below the gray layer is distinctly gritty, owing to the presence of sand particles of various sizes.

In places along the broken surfaces of the dark-colored layers of this soil a small amount of white limelike material occurs as a coating. This effervesces with acid, indicating the presence of carbonate of lime. The gray layer effervesces very freely, indicating a considerable accumulation of lime.

Below the 5 feet of soil, which has been described and which constitutes the soil on which the growth of crops are dependent, are alternating layers of soil material, sand, waterworn gravel, and caliche or lime hardpan. In some wells within the area as many as four distinct layers of caliche were noted at various depths, but in typical Mimbres silty clay loam or other soils of the Mimbres series caliche does not lie within 5 feet of the surface and has therefore little if any effect on the movement of moisture within the zone penetrated by plant roots.

The principal areas of Mimbres silty clay loam are in the central part of the area surveyed, occupying parts of a belt extending southward from near Deming to the southern boundary of the area. Tracts are broad and level.

The native vegetation on this soil consists very largely of tobosa grass, which in this area is a reliable indicator of Mimbres soils since it grows to only a slight extent on other soils. Grama and other grasses are also present, and in places there are scattered growths of yucca and Poptillo or "Mormon tea." The presence of these plants, however, in most places indicates a more loamy soil or the presence of sand, gravel, or gray silt near the surface. In some places the soil also supports a heavy growth of small mesquite or of mesquite and chamiso.

It is estimated¹ that at the present time a total of only about 8 square miles of Mimbres soils, mainly Mimbres silty clay loam and its dark-colored phase, is under cultivation. The soil lies well for irrigation, within the area of shallow water; it has a high moisture-holding capacity, especially after it has been under cultivation for some time and has been improved by tillage and the addition of organic matter; it is rich and productive; it is smooth and easily put under cultivation, requiring little clearing or leveling; and it blows and drifts to less extent than the lighter-textured soils.

The principal cash crops in the order of their importance² are cotton, beans, potatoes, tomatoes, sweetpotatoes, onions, watermelons, cabbage, cantaloupes, chili peppers, and strawberries. Grapes, peaches, plums, and apples are the principal fruits. Feed crops, in the order of their importance, are grain sorghums (including hegari, milo, and kafir), alfalfa, sweetclover, corn, and small grains.

The amount of irrigation water used on these crops is approximately as follows: Cotton and beans, 15 acre-inches; tomatoes, sweetpotatoes, watermelons, cantaloupes, grain sorghums, and corn, about 18 or 20 acre-inches; small grains, slightly more than 20 acre-inches; potatoes, cabbage, and onions, from 24 to 26 acre-inches; and alfalfa about 48 acre-inches.

The estimated average acre yields are as follows: Cotton, 400 pounds of lint; beans, 1,200 pounds; potatoes, 12,000 pounds; tomatoes, 8 tons; sweetpotatoes, 9 tons; onions, from 25,000 to 40,000 pounds; cabbage, about 9 tons; and chili peppers, dried, 1,200 pounds.

About 95 per cent of the cotton grown is of the Acala variety, a long short-staple variety well suited to this region. It receives from 2 to 4 irrigations. Both pinto and pink beans are grown, the pinto variety as a rule giving slightly larger yields. (Pl. 1, A.) Potatoes receive light irrigations, but the water is applied 6 or 8 times a season. Grain sorghums are irrigated about 3 times and yield from 60 to 80 bushels to the acre. Tomatoes receive 6 or 8 irrigations. Yields of this crop vary widely, depending largely on seasonal conditions, and the quality and flavor are said to be excellent. The contract price for the crop in 1928 was \$20 a ton. Water is applied, by the small check method with low dikes, to alfalfa 8 or 10 times during a season. When sufficient water is applied, four cuttings are obtained, and occasionally a small fifth cutting is made. The third cutting is the heaviest. The yield is said to be as much as 6 tons to the acre for the season. On account of the present high cost of pumping water, little alfalfa is grown for market.

Mimbres silty clay loam, heavy-subsoil phase.—The heavy-subsoil phase of Mimbres silty clay loam is slightly more reddish brown at the surface than the typical soil. In places varying amounts of igneous and metamorphic gravel are scattered over it. Bare smooth spots or playas are more numerous than in typical Mimbres silty clay loam, and the heavy deep subsoil is reddish brown. The layer of gray silt may be thin or even absent. This soil consists of alluvial material deposited over the more reddish-brown soils of the Mohave series occupying the adjacent slopes. There has also been more or less mixing with soil material washed from the slopes.

¹ Figures furnished by the county agricultural agent.

² Information from County Extension Agent J. W. Boutz, Deming, N. Mex.

The principal areas of this phase of soil extend as long, narrow strips from a point less than a mile east of Red Mountain to near Hondale. Another extends from United States Highway No. 80, northwest of the Little Florida Mountains, southwest a distance of nearly 6 miles. A rather large tract is in the northeastern part of the area, south of Carne, and two small tracts lie northeast of Red Mountain.

The native vegetation on this soil is similar to that on typical Mimbres silty clay loam, but over most of the areas west of the Little Florida Mountains, where moisture is somewhat more plentiful there is also a heavy growth of rank saccaton grass.

Mimbres silty clay loam, dark-colored phase.—This dark-colored soil differs from typical Mimbres silty clay loam in being slightly darker brown at the surface, in being better supplied with organic matter and hence loamier and of slightly higher moisture-retaining capacity, in the absence of the gray layer in places, and in the presence of gritty brown or reddish-brown loam or clay loam in the deep subsoil.

This soil has been formed by the slight weathering of material deposited by recent overflow from Mimbres River and a few small arroyos. As a whole it is more variable than the typical soil.

At the Hatfield ranch and extending across United States Highway No. 80 to the southeast is an area of about 1 square mile in which this phase of soil has been modified by sand, apparently blown from the northwest and mixed by leveling and cultivation. Here the soil in places has a loamy and sandy texture. Sand and waterworn gravel may also have been deposited here by overflow from Mimbres River.

The largest and most important area of this soil lies between the Hatfield ranch and the lower northeast slope of the Little Florida Mountains. A smaller area extends along the channel of Mimbres River 2 miles northwest of the extreme northern slope of these mountains, and a few small areas are elsewhere along small arroyos. All the areas are subject to occasional overflow and deposition of alluvial material.

The native vegetation on this phase of soil consists of the plants seen on the typical soil, with some saccaton grass along the old channel of Mimbres River northeast of the Little Florida Mountains. (Pl. 1, B.) Crops grown and yields obtained are also similar to those on the typical soil.

Mimbres silty clay loam, heavy phase.—The heavy phase of Mimbres silty clay loam differs from the typical soil in being slightly heavier in texture, in containing more bare playalike spots, in developing large open cracks when very dry, in the greater thickness of the dark-colored surface layer, and in having only a thin gray layer or none at all.

This soil has been formed by overflow of Mimbres River and consists of the very finest silts and clays which have been carried by the water after much of the coarser sands and gravel has been dropped farther upstream. Scattered through the areas, however, are narrow, slight ridges of waterworn gravel and sand.

Table 3 shows the results of mechanical analyses of samples of the surface soil, subsurface soil, and two layers of the subsoil of typical Mimbres silty clay loam.

TABLE 3.—*Mechanical analyses of Mimbres silty clay loam*

| No. | Description | Fine gravel | Coarse sand | Medium sand | Fine sand | Very fine sand | Silt | Clay |
|--------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | <i>Per cent</i> |
| 500410 | Surface soil, 0 to 2 inches..... | 0.2 | 1.0 | 1.6 | 13.4 | 11.6 | 39.6 | 32.8 |
| 500411 | Subsurface soil, 2 to 18 inches..... | .0 | .6 | .9 | 8.1 | 9.0 | 44.6 | 36.8 |
| 500412 | Subsoil, 18 to 36 inches..... | .2 | .5 | .3 | 1.9 | 3.4 | 72.1 | 21.8 |
| 500413 | Subsoil, 36 to 60 inches..... | .6 | 3.5 | 2.9 | 29.5 | 30.0 | 24.1 | 9.9 |

MIMBRES LOAM

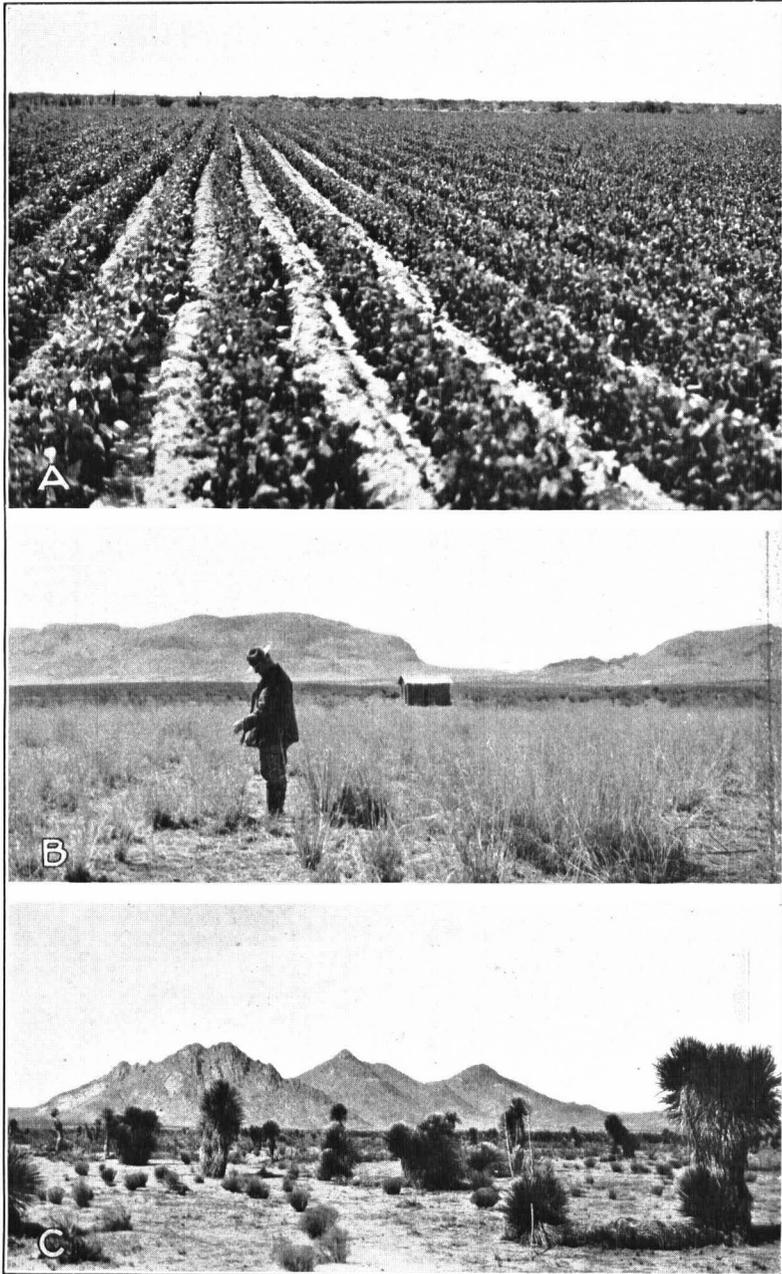
Mimbres loam has a dark-brown or dark grayish-brown light-textured loam or fine sandy loam surface soil. Over the surface is a thin, easily broken crust. Below this is a mulch layer, about 1 inch thick, of loose and somewhat granular material. This layer is not so well developed as in Mimbres silty clay loam. The second layer, which extends to an average depth between 12 and 15 inches, is very dark-brown or very dark grayish-brown loam of fine texture. It forms easily broken clods ranging from very small to 2 inches in diameter. The next layer, extending to a depth of about 25 inches, is slightly lighter grayish-brown or gray silty material through which are small white specks of lime accumulation. Between depths of 25 and 60 inches the material differs from that above principally in having a slightly greater content of fine and very fine sand.

The principal characteristics of this soil are its light fine loam or silt loam texture and its uniformity in both color and texture to a depth of 5 or more feet. However, rather important variations are found. Numerous small areas contain sufficient sharp sand to give the material a distinctly rough feel; in others waterworn gravel is on the surface and in the subsoil; and some tracts have been modified by mounds of sand, blown from adjacent areas and collected around clumps of shrubs. This soil occurs mainly as narrow strips between Mimbres silty clay loam and Mimbres fine sandy loam or silt loam and grades in texture into these soils. The eastern and northern parts of one small included area a mile southeast of Luxor are sandy, and the southwestern part is dark colored and heavy.

Mimbres loam occurs mainly in the broad belt of Mimbres soils which extends from near Deming south to the boundary of the area. It occupies long narrow strips having the same general north-west-southeast trend as areas of Mimbres silty clay loam. As a whole this soil lies slightly higher than the silty clay loam but not quite so high as adjacent slight ridges of the fine sandy loam. Probably one-half or more of the land is hummocky, and leveling is expensive.

The native vegetation on this soil consists of mesquite, chamiso, and Poptillo, with yucca in places. Grama and several other grasses make a scattered growth.

Several small areas of this soil are under cultivation and are productive. This land is more easily cultivated than Mimbres silty clay loam and is especially suited to crops requiring intensive cultivation. The principal drawbacks to its use are the cost of clearing and leveling, its slightly higher moisture requirements, and its tendency to blow, causing growing crops to be cut off or injured by the movement of sand over the surface.



A, Pinto beans on Mimbres silty clay loam near Deming; B, tall saccaton grass on the dark-colored phase of Mimbres silty clay loam along United States Highway No. 80, northeast of the Little Florida Mountains; C, Tres Hermanas Mountains with characteristic desert vegetation of yucca in the foreground



Soil profile showing two layers of caliche, each about 2 feet thick, exposed along the bank of Mimbres River about 1 mile northeast of Deming in an area of Karro soil

Crop adaptation, yields, and water requirements are similar to those given for Mimbres silty clay loam.

Onions do better on this soil than on the silty clay loam. They require about 24 acre-inches of water, applied in frequent light irrigations, and yield from 23,000 to 45,000 pounds to the acre. Sweetpotatoes require about 24 acre-inches of water and yield around 9 tons to the acre. Cabbage requires about the same amount of water as sweetpotatoes and yields from 12 to 15 tons to the acre. Peppers produce about 1,500 pounds.

MIMBRES GRAVELLY LOAM

To a depth of an inch or slightly more Mimbres gravelly loam consists of dark-brown or dark grayish-brown loose, moderately crusted loam, which is somewhat flaky instead of finely granular. Below this is slightly reddish very dark-brown loam through which is distributed considerable sharp and some waterworn gravel. At an average depth between 12 and 15 inches below the surface, this layer grades into slightly lighter-colored and more sandy and gravelly material. The sand and gravel increase in amount and in size downward and grade in many places, especially where slightly ridged, into gravel beds which are used for surfacing roads. In places waterworn gravel is distributed over the surface in considerable quantities.

Much of this land is nearly level but where shallow and most gravelly it is slightly ridged. The largest area is about 5 miles south of Deming along the Deming-Columbus highway. A few other small areas occur in that vicinity. Many small areas were included with Mimbres loam in mapping.

Native vegetation on this soil consists largely of Popotillo, scattered yucca, some mesquite, and a thin growth of grasses. A small acreage has been under cultivation, but none is cultivated at this time.

On account of its gravelly subsoil this soil is less valuable agriculturally and less well suited to irrigation than Mimbres loam.

MIMBRES SILT LOAM

Mimbres silt loam consists of dark-brown or dark grayish-brown silt loam, crusted at the surface where bare of vegetation. Below the crust is a well-developed finely granular layer about 2 inches thick, in which the soil grains are small and somewhat angular. Below this is a layer of very slightly darker grayish-brown silt loam which when dry breaks into easily crumbled irregular clods from one-fourth to 1 inch in diameter. This layer continues to a depth of 10 or 12 inches, where it is underlain by slightly lighter grayish-brown silt loam which appears loose and flourlike when rubbed in the hands. This extends to a depth of about 30 inches, where it grades into light-gray very fine sandy loam or coarse silt loam continuous to a depth of 60 or more inches.

The soil occurs in numerous small distinct areas throughout the region covered by the Mimbres soils. Many of the areas are nearly circular or elliptical and are slightly basinlike. From their shape and occurrence they appear to be the result of wind action which

has removed the surface soil from areas of Mimbres silty clay loam and Mimbres loam, leaving the gray silty layer exposed at the surface. Many of the areas are nearly bare; others support a scattered growth of chamiso and mesquite. Small patches are under cultivation, and fair yields are obtained, but the soil as a whole is less productive than the silty clay loam or loam of the Mimbres series.

Mimbres silt loam, dark-colored phase.—The dark-colored phase differs from typical Mimbres silt loam in having a darker-gray surface covering well filled with organic matter to a depth of 12 or more inches. Recent deposits from overflow of Mimbres River, growth and decay of a rather luxuriant grass cover, and cultivation with the addition of organic matter have given rise to the dark surface layer. This layer is not very uniform, ranging from light loam in the lower parts of the areas to fine sandy loam adjacent to sandy areas. Some areas near the channel of Mimbres River are low lying and of little agricultural value.

The largest continuous area of this soil extends across secs. 31, 32, 33, 34, and 35 in T. 23 S., R. 7 W., and sec. 36, T. 23 S., R. 8 W. Here the soil is covered by a good growth of tobosa and saccaton grasses. Small areas are elsewhere. Parts of some areas are or have been under cultivation.

Soil of this kind is well suited to crops requiring intensive cultivation, but the water requirements are high.

MIMBRES FINE SANDY LOAM

The 1-inch surface layer of Mimbres fine sandy loam consists of dark-brown or dark grayish-brown loamy fine sand slightly crusted at the surface. This is underlain to a depth of about 10 inches by slightly darker-brown light-textured fine sandy loam with a small content of medium and coarse sand and small sharp gravel. The next lower layer, which is continuous to a depth of 24 inches, is slightly lighter-brown or grayish-brown light-textured fine sandy loam or loamy fine sand, which grades into light-gray loose flourlike silt loam free from sand and gravel but containing a small amount of white limelike material. Below a depth of 48 inches is light-brown or grayish-brown fine sand or light-textured fine sandy loam. Waterworn gravel is of common occurrence in places in the deep subsoil and in some places is found scattered over the surface and through the surface soil and subsoil.

The surface relief of this soil as a whole is less uniform than of the adjacent heavier types. Some areas are comparatively level but many are more or less ridged. In some places the hummocks are small and in some are large and dunelike.

Tracts of this soil are widely distributed throughout the area covered by the Mimbres soils between Deming and the southern boundary of the surveyed area, occurring as long, more or less broken belts with a general northwest-southeast trend. East of Deming several tracts are along both sides of Mimbres River, extending eastward almost to the boundary of the area.

Mimbres fine sandy loam, level phase.—The level phase of Mimbres fine sandy loam differs from the typical soil in occupying nearly

level areas, in being in places slightly heavier in texture, and in its slighter depth to the gray silty subsoil. Numerous small areas have been included with the typical soil in mapping.

Parts of this phase of soil are under cultivation and are well suited to truck and garden crops. The water requirements are high.

Mimbres fine sandy loam, mound phase.—In many places Mimbres fine sandy loam has been blown into mounds by wind action. Such areas consist of long ridges, occurring mainly along the edges of fine sandy loam areas, and are made up of a series of mounds from 3 to 10 feet high caused by an accumulation of drifting sand around clumps of native vegetation, largely mesquite. These areas are mapped as the mound phase of Mimbres fine sandy loam.

MOHAVE CLAY LOAM

The 1-inch surface material of Mohave clay loam is light reddish-brown finely granular clay loam fairly well crusted at the surface. On the surface are dark-colored igneous and metamorphic gravel, in places rather abundant. Below the thin mulch layer is more pronounced reddish-brown heavy clay loam which on drying breaks into hard irregular clods. At a depth of about 12 inches this grades into a slightly lighter reddish-brown soil continuous to a depth of 36 or 40 inches, through which are distributed white spots of lime accumulation which increase in size and abundance with depth, in places forming vertical streaks. Locally in the deep subsoil an accumulation of lime carbonate or soft caliche also occurs.

In places this soil supports a rather scattered growth of tobosa grass and a scant growth of other grasses, some mesquite, buckthorn, and where very gravelly, creosote bush. Bare playalike spots are numerous.

Were abundant water supplied this soil would doubtless be productive but on account of its heavy texture and sticky consistence it is rather refractory. The principal areas occur in the vicinity of Red Mountain. None of the land is under cultivation.

Mohave clay loam, overflow phase.—The overflow phase of Mohave clay loam differs from the typical soil in having a 2 or 3 inch covering of dark-colored soil. This land occupies shallow basinlike areas and low belts where it has been influenced by overflow or has held water collected from run-off. In places it supports a good growth of tobosa and other grasses.

MOHAVE LOAM

The surface layer of Mohave loam is distinctly reddish-brown finely granular sandy loam or light-textured loam, fairly well crusted at the surface and carrying considerable small sharp gravel. Below a depth of 1 or 1½ inches is deep reddish-brown or dull-red light-textured but rather sticky loam containing enough small sharp gravel to impart a rough feel when rubbed in the hands. The stickiness increases with depth, and the soil when dry breaks into irregular fairly easily broken lumps. Below a depth of 12 inches this layer grades into slightly lighter reddish-brown loam or clay loam containing white spots of lime accumulation which increase in number and size with depth, in some places forming vertical white streaks and in others a fairly well-developed but soft caliche.

If well supplied with water and properly handled level areas of this soil should prove moderately productive. A rather large level area lies northwest, west, and south of Red Mountain. Other areas are north of Mimbres River between Carne and Deming. Much of the soil has been mounded by wind action until it is of little value. It supports a heavy growth of small mesquite and in some gravelly areas creosote bush and buckthorn grow.

Table 4 shows the results of mechanical analyses of samples of the surface soil, subsurface soil, and two layers of the subsoil of Mohave loam.

TABLE 4.—*Mechanical analyses of Mohave loam*

| No. | Description | Fine gravel | Coarse sand | Medium sand | Fine sand | Very fine sand | Silt | Clay |
|--------|---------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | <i>Per cent</i> |
| 500414 | Surface soil, 0 to 1½ inches..... | 6.9 | 21.8 | 11.8 | 30.4 | 13.8 | 6.8 | 8.7 |
| 500415 | Subsurface soil, 1½ to 12 inches..... | 1.9 | 14.3 | 9.9 | 26.9 | 12.0 | 13.0 | 22.6 |
| 500416 | Subsoil, 12 to 18 inches..... | 1.9 | 12.5 | 7.3 | 18.2 | 9.2 | 18.0 | 33.0 |
| 500417 | Subsoil, 18 to 40 inches..... | 6.4 | 14.3 | 6.0 | 16.0 | 10.8 | 43.6 | 2.9 |

MOHAVE SANDY LOAM

The surface layer of Mohave sandy loam is distinctly reddish-brown sand or loamy sand, slightly crusted at the surface. Below this layer, which is about 1 inch thick, is deeper reddish-brown light sandy loam containing enough sharp, medium, and coarse sand to give it a rough feel when rubbed in the hands. With increasing depth the material becomes more sticky. It grades, at a depth of about 15 inches, into slightly brighter reddish-brown heavy sandy loam or loam containing small white specks and spots of lime accumulation which increase in number and size with depth and are abundant below 25 inches, giving the entire mass a whitish appearance and in places forming a soft partly developed caliche. Below this layer is reddish-brown soil material or in places beds of gravel. Considerable gravel is on the surface and scattered through the surface soil of some areas.

Areas of this soil occur in the vicinity of Red Mountain. The higher and more gravelly parts support a growth largely of creosote bush. In a nearly level area extending westward from Deming the caliche is practically as thick and hard as that in the Karro soils. Areas northeast of Deming are badly mounded and support a growth of mesquite and a few buckthorn shrubs.

None of this soil is under cultivation, and on account of its high water requirement it is of low agricultural value.

MOHAVE GRAVELLY COARSE SANDY LOAM

Mohave gravelly coarse sandy loam has a thin fairly well-crusted surface layer of flaky and finely granular reddish-brown coarse sandy loam about 1½ inches thick. Below this is deeper reddish-brown coarse sandy loam containing considerable small sharp gravel. This material extends to a depth of about 12 inches, becoming heavier and more sticky with depth. It is underlain by dull reddish-brown heavy coarse sandy loam or loam containing scattered small

spots of white lime accumulation. These spots increase with depth and below 40 inches are so abundant that they give the entire sub-soil layer a light-gray appearance and in places form a soft poorly developed caliche. In much of the soil, in addition to the small sharp gravel, larger igneous and metamorphic gravel is present.

The native vegetation differs from place to place. In some of the lower areas it is almost entirely mesquite; in others it is largely yucca. On the more gravelly areas it is principally creosote bush or a mixed growth. In places scattered growths of native grasses are present. This soil has little value in this region for cultivated crops.

KARRO CLAY LOAM

Karro clay loam has a brown or grayish-brown surface soil well crusted at the surface and somewhat granular to a depth of about 1½ inches. This layer is flaky or cloddy rather than finely granular as in the heavy-textured soils of the Mimbres series. It is underlain to a depth of about 8 or 10 inches by dark grayish-brown heavy material which when dry breaks into irregular hard clods. The next lower material, which continues to an average depth of about 24 inches, is slightly lighter-textured dark grayish-brown silty clay loam in which are small pieces of white limy material. In the lower part of this layer in many places there is a very thin layer of slightly more reddish-brown material, immediately beneath which is a heavy well-developed layer of lime hardpan or caliche. (Pl. 2.) At the surface of the hardpan there is in many places a thin very hard layer with softer material underneath. The caliche ranges in thickness from 18 to 30 inches and grades below into reddish-brown uncemented material. Karro clay loam consists of normal Karro soil with a surface covering of material recently deposited by Mimbres River.

In some places this soil supports a mixed growth of chamiso and mesquite and in others of tobosa grass. Where the surface layer is 24 or more inches thick this soil approaches Mimbres silty clay loam in crop value; much of the soil, however, is shallower and of lower value. The principal areas occur along the edge of the old Mimbres River Valley south of Deming.

KARRO LOAM

Karro loam has about a 1-inch surface layer of rather finely granular light-brown or grayish-brown loam, moderately crusted and with an abundance of white caliche fragments on the surface. This is underlain to a depth of about 10 inches by brown or grayish-brown loam which breaks into irregular fairly easily broken clods. The next lower layer, continuous to a depth of about 24 inches, is slightly lighter-brown loam in which are numerous specks of white caliche. It is abruptly underlain by nearly white highly developed caliche.

Chamiso on Karro loam makes a large growth and is an important winter forage plant. Salt sage is one of the most important plants in reestablishing vegetation on the playas and is also of value for forage.

With abundant water supply Karro loam would doubtless produce moderately well, but the caliche takes up large amounts of moisture, causing the water requirements to be high. At present the land is poorly suited to cultivated crops.

Karro loam, heavy-subsoil phase.—The heavy-subsoil phase of Karro loam differs from the typical soil principally in having a thin layer of gray or reddish-gray sticky plastic clay loam or clay directly above the caliche. This layer seems to be almost impervious to water, which stands on it for a long time after rains without being absorbed. Bare playas are numerous, and in places the presence of alkali is indicated. This soil is less desirable for cultivation than the typical soil.

KARRO FINE SANDY LOAM

Karro fine sandy loam has a 1 or 1½ inch surface layer of slightly granular brown or grayish-brown fine sandy loam somewhat crusted at the surface. Scattered over the surface and through the soil are numerous small particles of white caliche. This layer is underlain to a depth of about 10 inches by grayish-brown light-textured fine sandy loam, below which is slightly lighter grayish-brown light-textured fine sandy loam containing more caliche. Typical caliche is reached at a depth ranging from only a few inches to 18 or more inches. Small undifferentiated uneven patches of lighter texture, largely loamy fine sand, have been included in mapping. Native vegetation and crop values are about the same as on the typical soil.

Areas of this soil are nearly level. The principal growth is chamiso, mesquite, grama, and other low-growing grasses. The moisture requirements of the soil are high, and it has little value for cultivated crops.

Karro fine sandy loam, shallow phase.—This shallow soil differs from typical Karro fine sandy loam in being very shallow. The caliche in most places lies within 12 inches of the surface. The surface soil is light gray and although slightly crusted is loose and flourlike and seems to consist very largely of powdered and small loose fragments of caliche.

In places scattered chamiso, mesquite, and Jerusalem thorns (*Koeberlinia spinosa*) are to be seen, but the greater part of the land is covered by small, low-growing, false buffalo grass (*Munroa squarrosa*), a plant of only slight forage value.

This soil is of practically no value for cultivated crops and of only slight value for forage crops.

Table 5 shows the results of mechanical analyses of samples of the surface soil, subsurface soil, and two layers of the subsoil of typical Karro fine sandy loam.

TABLE 5.—Mechanical analyses of Karro fine sandy loam

| No. | Description | Fine gravel | Coarse sand | Medium sand | Fine sand | Very fine sand | Silt | Clay |
|--------|---------------------------------------|-------------|-------------|-------------|-----------|----------------|----------|----------|
| | | Per cent | Per cent | Per cent | Per cent | Per cent | Per cent | Per cent |
| 500429 | Surface soil, 0 to 1¼ inches..... | 1.2 | 6.0 | 5.5 | 31.7 | 28.6 | 16.3 | 10.8 |
| 500430 | Subsurface soil, 1¼ to 10 inches..... | 2.2 | 5.8 | 4.6 | 27.0 | 24.1 | 18.6 | 17.6 |
| 500431 | Subsoil, 10 to 18 inches..... | 1.9 | 5.7 | 4.7 | 29.0 | 23.8 | 21.0 | 13.8 |
| 500432 | Subsoil, 18 to 24 inches..... | 2.9 | 7.4 | 5.4 | 28.5 | 19.8 | 23.4 | 12.9 |

RIVER WASH

River wash consists of rather recently deposited fine sandy loam and fine sand, occurring alternately with thin layers of gray silt. It seems to hold moisture rather well but has an uneven surface

and supports a growth of weeds, blue sage, and yucca. A considerable area extends along the channel of Mimbres River and is subject to overflow during flood periods. None of this class of land is under cultivation.

ROUGH STONY LAND

Rough stony land consists of rocky or stony areas in which fine soil material is absent or is thin and intermixed with a large proportion of rock outcrop or fragmental stone.

The scanty vegetation consists largely of creosote bush with a scant growth of native grasses on the lower and less stony areas.

This land is predominantly rough and broken or steep, and owing both to lack of fine soil material and to unfavorable relief is unsuited to cultivation and has practically no agricultural value. It occurs mainly on Red Mountain, Snake Hills, and the northern slopes of the Little Florida Mountains.

AGRICULTURE

Prior to 1909 the Deming area was largely devoted to cattle grazing. In 1909 it was discovered that water for irrigation could be obtained from wells. The land was surveyed and opened for settlement, and a rapid filing of homestead claims began. In a very short time all the lands embraced in this survey had been filed on. Some filings are said to have been made for purposes of speculation rather than for actual settlement and farming, but many were made by actual settlers. Much land was cleared and leveled, wells were dug or drilled and pumping machinery installed, reservoirs and ditches were constructed, houses were built, the land was fenced, and roads were opened on practically every section line.

Later, homesteads and other lands were bought and sold at increased prices. Money was borrowed for improvements and equipment, the land being accepted as collateral by loan companies. As in many other newly developed countries, there was considerable exploitation. Companies were organized and lands sold to non-residents unacquainted with western agricultural conditions and the requirements of irrigation. Expensive pumping machinery, some unsuited to the requirements, was sold to men unable to operate it efficiently. An important part of the improvement of every homestead consisted of one or more wells from 25 to 75 or more feet deep. Many of these were cement lined.

This state of activity and apparent prosperity continued until about 1914 or 1915. Farmers then learned that they could not produce the crops which are grown in this region at a profit, and within the next few years many farms and homesteads were abandoned, and houses and other buildings were torn down or left to deteriorate. Wells were left open, pumping machinery was carried off, and fields where the native vegetation had been broken up were left unprotected to be swept by the winds. The sands drifted, and much land which had formerly been of considerable value for grazing purposes became almost worthless. Loan companies foreclosed mortgages on the land, much of which is now held by them. Other areas are held by the original owners. Much of the land can be bought for less than the original cost of improvements.

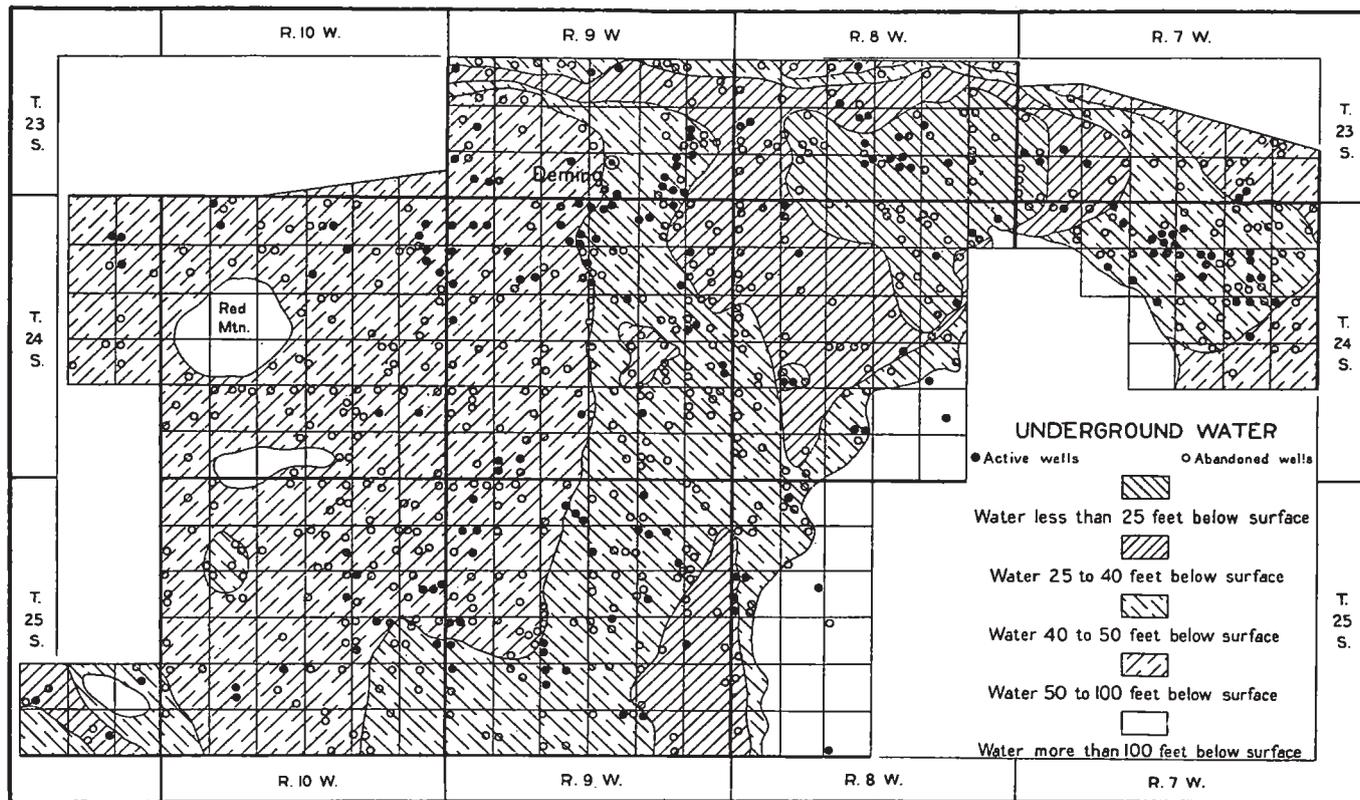


FIGURE 2.—Sketch map showing location and approximate depth of wells in the Deming area, New Mexico

Figure 2 shows the wells seen during the progress of the soil survey. Many have been filled and obliterated by blowing sand, and doubtless many others were not found. Some of the wells were for the purpose of supplying water for livestock or for domestic use, but probably three-fourths or more were for supplying irrigation water. Each well so used involved the installation of expensive pumping machinery, the clearing and leveling of land, and the construction of irrigation ditches. The very large number of such abandoned wells shown in Figure 2 indicates to some extent the enormous economic loss involved in the settlement and partial abandonment of this area.

The abandonment of this area seems to have been brought about by the following conditions: (1) The high lift for irrigation water; (2) small profits to be made from crops adapted to this region; (3) use of inefficient and expensive pumping machinery; (4) use of much land of high water requirement and medium or low productivity; (5) ownership of land by nonresidents and persons unacquainted with western agriculture or the requirements of irrigation; (6) distance from markets; and (7) high freight rates. To these causes, during recent years, may be added the low price of cattle and the shortage of range caused by several unusually dry seasons.

At the present time there are within the area surveyed between 5,000 and 6,000 acres under cultivation,³ less than 3½ per cent of the total area. The tendency seems to be, however, toward stabilization and a gradual increase in agricultural activity. A recently formed water-users' association hopes to improve conditions by limiting irrigation largely to those areas in which water can be obtained at a depth of 70 feet or less, cultivating only those soils which are most productive and of higher moisture-holding capacity, distributing irrigated areas so that the water may be drawn on over as large an area as possible rather than used in concentrated areas, using better pumping machinery and obtaining better rates for power, thus lowering the cost per foot of lift, and introducing, if possible, crops of greater market value.

Deming, the trading center of the area, had in 1920 a population of 3,212. This town is the supply point for a number of small mines and for cattle ranches of the region.

The Deming area is well supplied with railroad facilities. It is on the main line of the Southern Pacific Railroad and the Rincon, Deming, and Silver City branch of the Atchison, Topeka & Santa Fe Railway.

United States Highway No. 80, which is an all-year route to and from the Pacific coast, crosses the area. This highway is well graded, is gravel surfaced, and is well maintained. A well-maintained State highway extends from Deming to Silver City and another from Deming through Columbus to the Mexican village of Palomas. Many of the roads laid out along section lines are open and used to some extent for local travel. Access to all parts of the area by these and by numerous cut-offs and diagonal trails is easy.

³ Figures supplied by county agricultural agent.

In the Deming area, as in most regions, the distribution of a part of the native vegetation is influenced by the soil. In certain places one variety of plant predominates almost to the exclusion of all others. In a near-by section some other plant of an entirely different kind is dominant. In other places there is an association of plants usually found growing together. In this area tobosa grass is a reliable indicator of a silty clay loam or clay loam soil. It is the predominant native growth on typical Mimbres silty clay loam and is seen on parts of the other heavier-textured soils. The taller saccaton grass (pl. B) grows where there is slightly more moisture. The most reliable indicator of light sandy soils of the Mimbres series is the blue sage. In places it is associated with yucca.

On outwash fans where the soil is coarse, sandy, and shallow the predominant and in many places almost the only growth is creosote bush (*Covillea glutinosa*), a pale-green shrub with a disagreeable odor.

The yucca (pl. 1, C) and the Popotillo or Mormon tea (*Ephedra viridis*) both grow on the sandy, loamy, and gravelly soils, in many places in close association. Scattered growths of yucca may be found on soil having a heavy surface soil but a sandy or gravelly subsoil. A growth in which yucca is dominant may be taken as an indication of loose sandy soils of either the Mimbres or Mohave series.

Chamiso or shadscale (*Atriplex canescens*) is not a good indicator of soil texture, since it makes a vigorous growth on light sandy soils, on heavy clay loam soils, and on all the intermediate soils. It thrives especially on soils of the Karro series, which seems to indicate a high lime requirement, but grows to only a slight extent on soils of the Mohave series where lime in the surface soil is less abundant.

False buffalo grass (*Munroa squarrosa*), a small coarse short grass, is found only on gravelly and sandy soils. It is especially abundant on loose sandy soils filled with powdered caliche.

Mesquite grows on practically all soils in the area and is therefore of little value as a soil indicator. This also is true of broomweed which is very abundant in abandoned cultivated fields regardless of the kind of soil.

Crops and soil usage have changed little since the first settlement of this region. Cotton has become a crop of increasing importance, because of its high money value and low water requirement. The importance of alfalfa, on the other hand, has decreased, owing to its low money value and high water requirement.

The principal crops, named in the order of their importance, are cotton, pinto beans, pink beans, potatoes, grain sorghums, tomatoes, alfalfa, onions, cabbage, sweetpotatoes, peppers, cantaloupes, and watermelons. The average yields and water requirements have been given in the discussion of crops on Mimbres silty clay loam.

Much of the farming is carried on in connection with livestock raising or dairying. Most of the livestock are cattle, although the region seems well suited to sheep. Considerable poultry is raised. There is a close and well-recognized relation between crop production and soils.

Average farm equipment consists of a moderately good house and other farm buildings, one or more wells with pumping machinery,

an earth or cement-lined reservoir, a tractor, an automobile, truck, and other farm implements. Work animals, cattle, and poultry are kept on most farms.

On account of unstable conditions land prices can not be given with much accuracy. Unimproved areas of the better soils can probably be bought for \$25 an acre. The less desirable soils sell for very much less.

SOILS

The Deming area lies well to the south in the high western plateau region. It has practically the same latitude as Jackson, Miss., and Savannah, Ga., but an altitude of more than 4,000 feet above sea level. The average annual rainfall is less than 10 inches, changes in temperature are frequent, winds are strong and dry, and the desert vegetation is scant. The area is surrounded by mountains of volcanic origin on which igneous and metamorphic materials predominate, but in which some materials are of sedimentary origin.

Long gentle slopes have been built up at the foot of the mountains by overlapping fans of outwash and colluvial material. These fans are constantly being augmented and pushed farther out into the plains by material carried down the small arroyos by torrential rains. Mimbres River, the largest stream of the region, is intermittent but at times has carried large amounts of flood waters which have deposited layers of heavy soil material. The lower layers deposited are of sand and waterworn gravel. Above this material is gray fine sand and very fine sand and light-gray silt. Above the silt is material which has reached various stages of soil development. The finer-textured material deposited in the lower-lying areas through the influence of larger amounts of moisture and a grass vegetation, has developed heavy dark-colored soils. On slightly higher areas where moisture was less abundant and the vegetation was different the soils are lighter brown and lighter textured. On the slightly higher adjacent ridges, which were influenced to less extent by moisture, were modified by wind, and supported another type of vegetation, the soils are light brown and very sandy. No caliche occurs within a depth of 5 feet in such places. The A horizon effervesces only slightly or not at all with acid, but the gray silty layer effervesces freely, indicating a degree of soil development.

On the slopes the reddish-brown soils are heaviest. The duller-brown soils are in lower areas where the influence of moisture and a grass vegetation was greatest. The most sandy and gravelly areas are on the upper slopes and around the apex of the fans. Caliche is much more developed on the lower slopes and nearly level areas than on the steeper slopes. The surface mulch and A horizon of these soils do not effervesce freely with acid, as do the B horizon and parent material.

The soils of the area represent three stages of caliche development—the Mimbres with no development, the Mohave with partial development, and the Karro with very high development. Numerous wells in the lower parts of the area expose, below the surface soil layers, a succession of layers of gravel, sand, old soils, and caliche, repeated as many as five or six times within a depth of 50

feet or less. These layers seem to indicate that the present period of soil formation is only one of a cycle which has in this region been repeated many times.

The salient features of the soils are their brown, light-brown, grayish-brown, reddish-brown, or dull-red color; crusting and development of surface mulch in the heavier types; the occurrence of smooth, barren playas in many places; abundance of lime in the surface soil or subsoil; the occurrence of cemented caliche layers over large areas; and the tendency of all the heavier soils to break into irregular instead of into somewhat regular clods on drying. The wind has been and is an important factor in the shifting of soil material from place to place.

The Karro soils have developed from material deposited on nearly level areas, which has remained in place for a long time. The surface soils are grayish brown, and the caliche layer in the subsoil is highly developed. The surface soils as well as the subsoils effervesce freely with acid.

SUMMARY

The Deming area includes 276 square miles on the high, nearly level plateau of southwestern New Mexico.

The soils belong to three series, the Mimbres, Mohave, and Karro, each of which represents a different stage in development of caliche or lime hardpan. In soils of the Mimbres series no caliche is present, but the subsoil effervesces readily with acid. In the Mohave soils there is a partly developed caliche layer, and in the Karro soils a highly developed caliche layer.

Mimbres silty clay loam is used much more extensively for farming than any other soil, though parts of the loam, silt loam, and fine sandy loam members of this series are used. Soils of the other series are cultivated to only a very slight extent.

Although practically all the area covered by this survey was homesteaded, a large part of it has been practically abandoned and at the present time only about 3½ per cent is under cultivation. The abandonment was owing to several causes, among which were the scarcity of water for irrigation, high cost of pumping water, and the fact that, owing to climatic conditions, only crops of low cash value could be grown.

The important crops are cotton, beans, grain sorghums, tomatoes, alfalfa, onions, cabbage, sweetpotatoes, peppers, corn, and sweet-clover.

Attempts are being made to stabilize and increase agriculture by confining cultivation to the soils best suited for it; by limiting pumping to areas having water at a depth of 70 feet or less, with pumping plants efficiently distributed; and by using more efficient pumping machinery and obtaining power at lower cost.

The new settler in this region should be well acquainted with soil and climatic conditions and the requirements of irrigation farming, and he should have adequate resources at his command.

[PUBLIC RESOLUTION—No. 9]

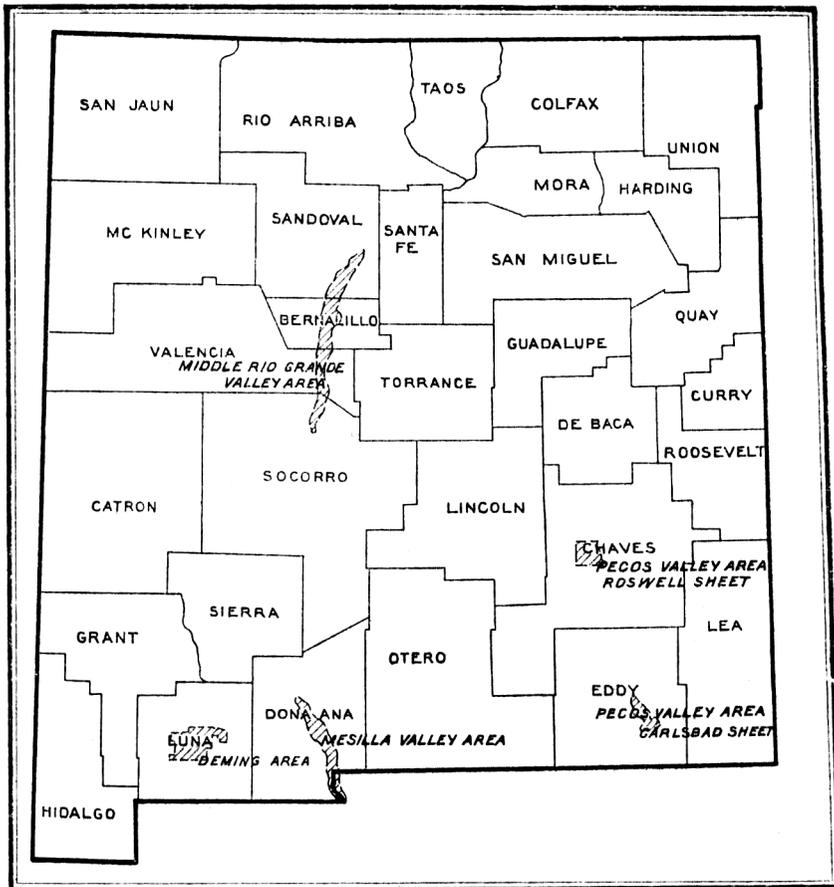
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided,* That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]



Areas surveyed in New Mexico, shown by shading

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