Soil Drainage near Guadalupe

observation wells used in study of drainage conditions as part of investigation of factors affecting plant growth

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Water table conditions especially were studied in the Guadalupe area during an investigation designed to obtain more information about the physical conditions affecting plant growth in the lower Santa Maria Valley.

Observation wells—10′ deep and cased with 2″ perforated pipe—were dug near Guadalupe. Water table readings were taken monthly.

A compilation of all of the data obtained from the observation wells indicates that the average height of the water table—during the two-year study period—was 3.96′ below the ground surface. The location of the observation wells must be considered in any interpretation of the data. Some of the wells were purposely located in depressions and in natural drainage channels where the water table is known to be high. However, the area extent of the high water table at these locations is not great. For example, well G-4 is located in a natural drainage way which is about 6′ below the prevailing land surface. Well G-5 is located adjacent to a surface runoff canal, which probably accounts for the usual high readings. Well G-8 is located in a natural drainage channel which is about 5′ below the prevailing ground surface. Well G-7 is also located in a low spot. Most of the other wells are located in areas representative of the surrounding areas. If the readings obtained on wells G-4, G-5, G-7, G-8, G-23, and G-25—both G-23 and G-25 are in drainage channels—are omitted, the average depth to water becomes 4.82′.

In general, the water table approaches the ground surface west from Guadalupe. In the first mile west of Highway No. 1—which runs north and south through Guadalupe—the average depth to the water table is greater than 5′ and therefore causes no particular problem, with the possible exception of a few local areas along drainage ways. In the second mile west of Highway No. 1, the water table is from 3′ to 5′ below the ground surface and is definitely a problem in some areas. In the main, the water table is highest on the area lying along the Guadalupe–Beach Road. One area, in particular, lying north of the Guadalupe–Beach Road and about 1.8 miles west of Guadalupe, has a definite accumulation of salt on the soil surface. This individual saline area is several acres in extent.

A low-lying area bracketed by wells G-16, G-17, and G-18 was tile drained about 1915. Most of the tiles are working satisfactorily and no drainage problem exists at present.

In the area 2–3 miles west of Highway No. 1, the average depth to the water table was about 3′ during the period of observation. It is in this area that the greatest possibility of crop reduction due to high water table exists. The lower lying lands—where wells G-22 and G-23 are located—are definitely limited to crops which will tolerate excessively wet conditions such as pasture grasses.

Over the Guadalupe area as a whole, the water table is somewhat higher during the rainy season than it is during the summer. However, the seasonal variation is not significant.

A clay layer occurs at a depth of 6′ to 10′ below the ground surface over most of the Guadalupe area and is suspected of causing the high water table. To further investigate the problem, a water stage recorder was installed in an

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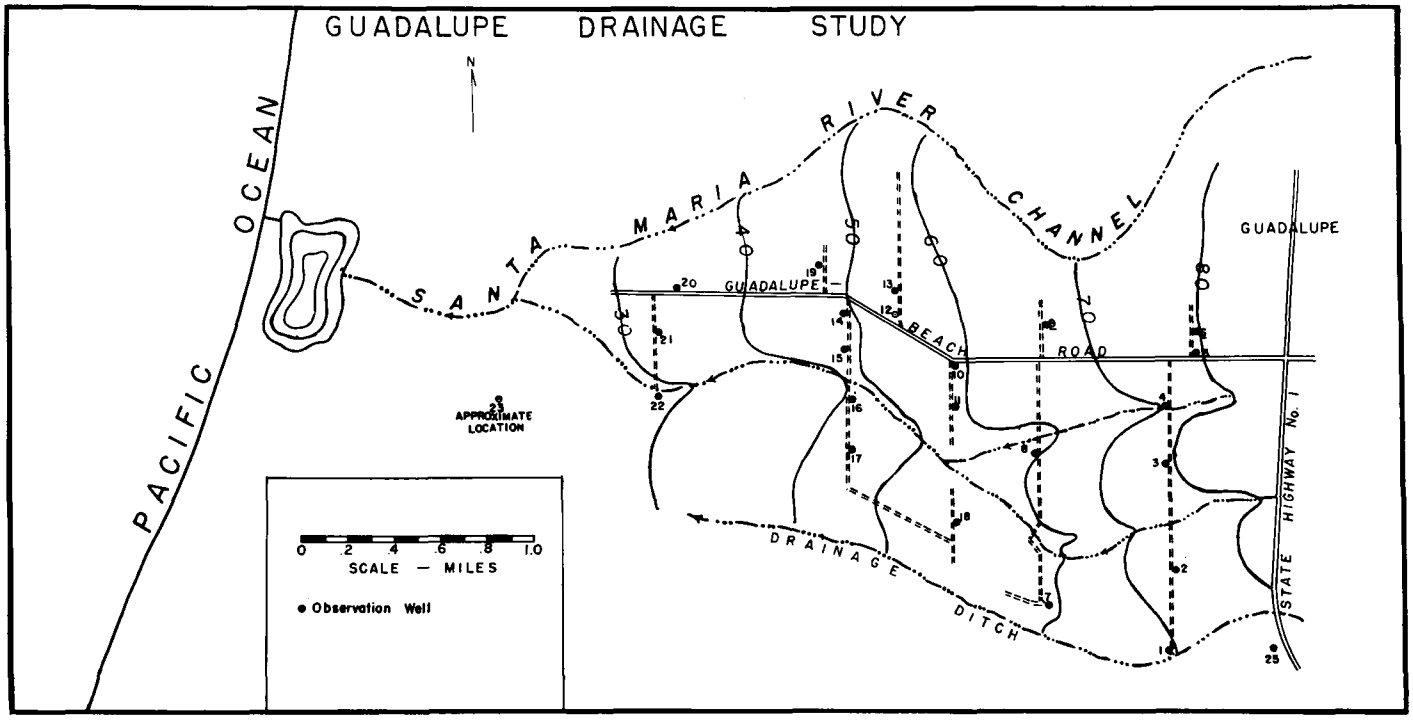
Map showing locations of observation wells in study.



SOIL DRAINAGE

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artichoke field, and the results are shown in the accompanying graph. The rise of the water table in June, July, and September is due to irrigation water ponding on top of the clay layer.

Careful control of irrigation is needed and can be accomplished by using short runs and accurately checking the depth of penetration at each irrigation.

Salinity

In arid regions the usual consequence of a high water table is the accumulation of salines or salts on the soil surface. Soil samples were collected at nine representative locations in the Guadalupe area. Samples were taken of the surface 6", 12"–18", and 18"–36". Soil cup tests were made to determine the per cent salt present. On the two sampling locations that showed presence of sufficient salt to influence plant growth, detailed analyses were made of the saturation extracts to determine the chemical composition of the salt.

Results of Soil Salinity Tests Taken From the Guadalupe Area

Sampling Location	Resistance (Soil cup)			Soil Texture
	0–6"	6–18"	18–36"	
1	740	1260	820	Sandy loam
2	370	440	300	Loam
	Furrow	Bed		Clay
3	235	182		loam
4	360			Clay
5	139	151	160	Clay loam
6	225			Loom
7	78	139	100	Loam
8	420	305	310	Fine sandy loam
9	220	200	200	Clay
	Per Cent Salt in Samples Indicating Salt			
5	.23	.21	.20	
7	.44	.23	.35	

Extract Analysis of 5 and 7 expressed as me/liter

K x 10^5	Na	Ca	Mg	K	Total
350.6	7.05	31.05	14.33	1.02	53.45
1976.4	135.82	30.20	92.50	2.46	260.98

At the present time salinity does not seem to be a serious problem in the Guadalupe area, with the exception of a small area of a few acres located at soil salinity sampling location No. 7. Slight salt accumulations were also noted at soil sampling location No. 5. Although the salinity problem is confined to small local areas at present, the problem might become more widespread during prolonged periods of high water table.

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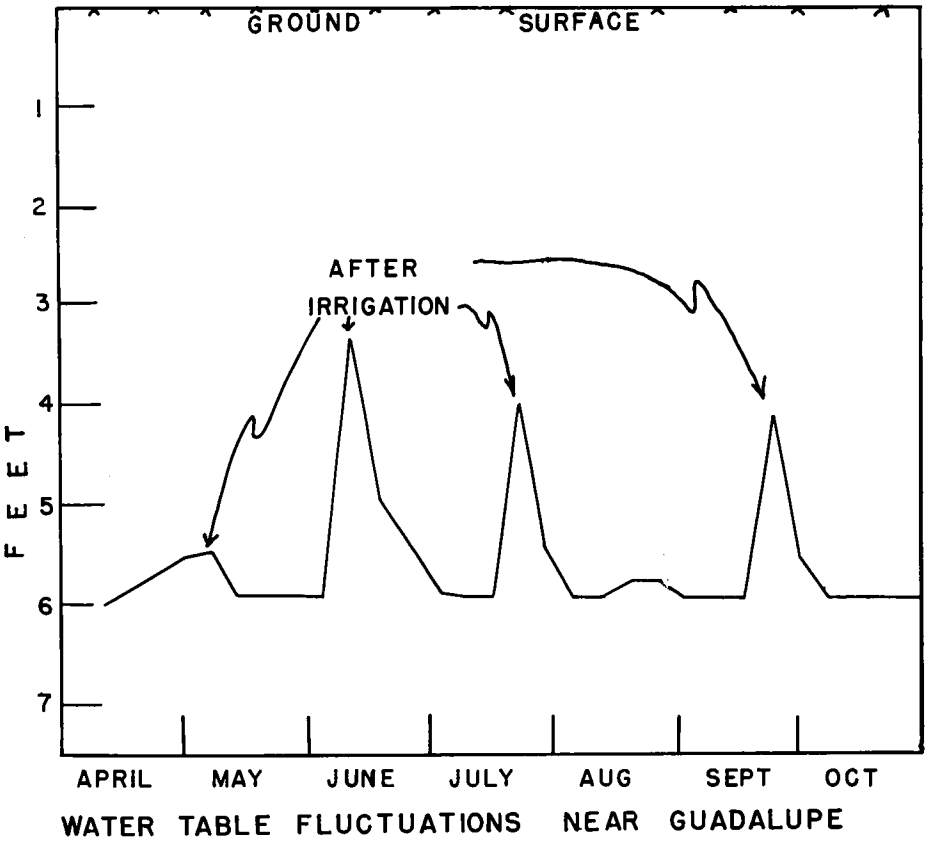

Automatic water level recorder in artichoke field.