Land Leveling Studies

survey of irrigation systems and practices in Coachella Valley may help in the development of new farm lands

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Irrigation systems and practices on existing farms were studied in Coachella Valley, and the findings are available for use on new agricultural land developed by the importation of Colorado River water into the area.

As part of the development program, this land must be leveled, and irrigation distribution systems installed. Satisfactory irrigation on newly developed land will be obtained when seven factors are correctly integrated. These factors were subject of the survey.

1. Soil type.
2. Length of run.
3. Width of channel irrigated—distance between centers of adjacent furrows or width of check.
4. Crop, especially with regard to its rooting depth. Age of the crop as it affects root ramification is as important as the specific crop.
5. Slope of the land.
6. Unit flow rate down the individual channel—check or furrow.
7. Application time—the interval during which the unit flow rate is being applied to the individual channel.

The farmer can not economically make a marked change in soil type, and he determines the crops he wants to grow. After he begins irrigation, he can adjust unit flow rate and application time to help achieve the desired irrigation. But run length, slope, and sometimes unit width, must be decided upon when the system is constructed. Information must be available on the optimum values for run length and slopes for various soil types. To obtain this and other information, eight farms in the Coachella Valley were investigated.

Two farms grew alfalfa, two others beets, and the crops on the remaining four farms were field corn, eggplant, grapes, and lemons.

Findings on Existing Farms

The studies showed run length to be correlated to soil type. Heavy soils, either on the surface or within the first six feet of depth, allowed the runs to be relatively long—between 1,100 and 1,300 feet. Soils of lighter texture, with little or no tight subsoils, had short runs, usually less than 400 feet. Only one farm had a run length between these figures—630 feet. From the investigation of water consumption and rate of advance of the water down the channels on this specific farm, this appeared to be at or above the upper limit of length on this soil—sands, with no impermeable layers for at least six feet.

Long runs are desired because they save installation costs. But the investigation showed that existing farms were laid out with run lengths generally consistent with the soil type.

The slope did not appear to be correlated to any factor. Slopes from essentially zero up to .7′/100′—.7 foot per 100 feet—gave satisfactory results. The slopes seemed to be based on the farmer's preference and on the general land fall before leveling. Information from other areas indicates advantages in keeping slopes down to .1′ to .2′/100′ if the cuts and fills are not too deep or the leveling too costly.

In general, the investigated farms had so integrated the seven factors affecting irrigation as to obtain a satisfactory water application. This is the goal for new developments. A complete soil and land survey is the first important step. The land survey furnishes information on slopes desirable and feasible. The soil survey, together with soil maps of the area, serves as a basis determining the length of the run.

Irrigation Practices

Of the seven factors affecting irrigation, five—soil, length, width, crop and slope—comprise the irrigation system; the other two—unit flow rate and application time—control the irrigation practice.

Poor practice may impair a satisfactory irrigation system; good practice can, to some extent, overcome the faults of a poor system.

Some farmers in the Coachella Valley have encountered difficulties in irrigating, and it is believed that a modification of practices would result in more satisfactory water application. Some of the troubles were investigated and possible solutions suggested.

Frequently the water turned into the farm by the water district is divided too much by the farmer; too small a unit flow is turned down each channel, both in furrow and check irrigation. When too small a unit flow is turned into a channel, the water does not advance at a satisfactory rate. The application time to get coverage is great, and the amount of water applied to the unit area—run length times channel width—is large. It would be better to turn a larger flow down fewer channels for a shorter period. It may be necessary to apply a high unit flow rate per channel until the water reaches the far end, and then reduce the flow rate. Reduction in flow rate provides water over the length of the run, with little or no runoff. Better control of the uniformity of application and of the total amount of water applied will result.

Sometimes excessive subdividing of the water is done intentionally. The water is turned down too many furrows or checks in the evening so that a water change will not be required during the night. This occurs most often on farms with the lighter textured soils and short runs. The practice wastes water, creates drainage problems, and may decrease crop production.

Some farmers consider irrigation complete when the soil is entirely wet up over the whole surface by subbing—subirrigating. With small seedlings it is important to furnish water to the whole volume of the roots. But when the planting is set out on the ridge top between deep furrows, the water must rise to this elevated ridge top by capillarity. Often serious deep percolation and water wastage occur during the time required to accomplish this subbing. Also, this practice results in the accumulation of salts in the ridges. It would be advantageous to plant the seeds on the side of the furrow just slightly above the waterline. In this way the limited root zone would be furnished water with a minimum wastage. Subbing is not necessary after the roots have ramified throughout the whole soil.

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