Sloping Seedbeds

soil salts minimized in germination zone by bed shaped to allow later cultivation

Leon Bernstein and Robert S. Ayers

Sloping seedbeds—to minimize the soil salinity hazard to germinating seeds—have been designed to permit conversion to normal flat-topped beds after the seedlings are established.

Soil salinity—excessive soluble salts in the soil—has often been responsible for poor stands of furrow-irrigated row crops in the Imperial Valley. As water moves into the bed from the furrows, it dissolves salts in the soil and carries them to the crown of the bed where they accumulate.

Seed of such crops as sugar beets and cotton—planted in flat crowned beds—is subject to considerable salinity hazard. Even in soil classified as nonsaline, enough salt may accumulate around the seed to prevent its germination.

This situation is most striking with single-row flat-topped beds for which as little as two millimhos EC_e—electrical conductivity of the saturation extract, a measure of soil salinity—in the plow layer at the time of bedding-up may result in impaired germination. Soils with an electrical conductivity of less than four millimhos are usually considered nonsaline for most crops grown in the Imperial Valley area.

With double-row beds, the situation is somewhat more favorable since salt accumulates in the center of the bed leaving a nonsaline zone along the shoulders. With such plantings, as much as five to ten millimhos of soil salinity in the plow layer at the time of bedding-up can be tolerated. Higher levels of salinity result in a broader salinized zone which encroaches on the planting line at the edge of the bed and produces spotty stands.

The most successful bed shape from the standpoint of minimizing salt accumulation around the seed is a sloping bed with seed planted on the slope several inches below the crown of the bed. In this case, the salt is carried beyond the planting line and leaves a nonsaline zone for the germinating seed.

Satisfactory stands have been obtained with sloping beds even when the salinity in the plow layer at the time of bedding-up was as high as 30 to 40 millimhos EC_e, which is roughly the degree of salinity found in lands flooded by sea water.

The accompanying diagram gives the bed shapes and dimensions for 30″ and 40″ sloping beds. The 30″ beds are preferred for sugar beets and the 40″ for cotton.

The design is such that no excess soil remains on one side of the bed when the sloping bed is converted to the normal flat-topped bed by cultivation. This conversion is readily accomplished by using standard tractor-drawn cultivating equipment such as side-knives or disc-hillers and by furrowing-out with sweeps.

Following establishment of the seedlings, accumulation of salt in the flat-topped bed is not so serious a problem and should not impair growth because the roots have penetrated into the nonsaline soil under the furrows.

In irrigating the sloping beds, water is applied in alternate furrows next to the gently sloping surfaces only. Following conversion to the normal flat-topped beds, irrigation water may be applied in every furrow.

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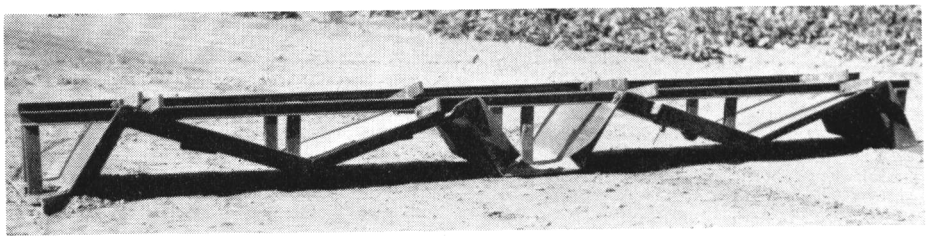
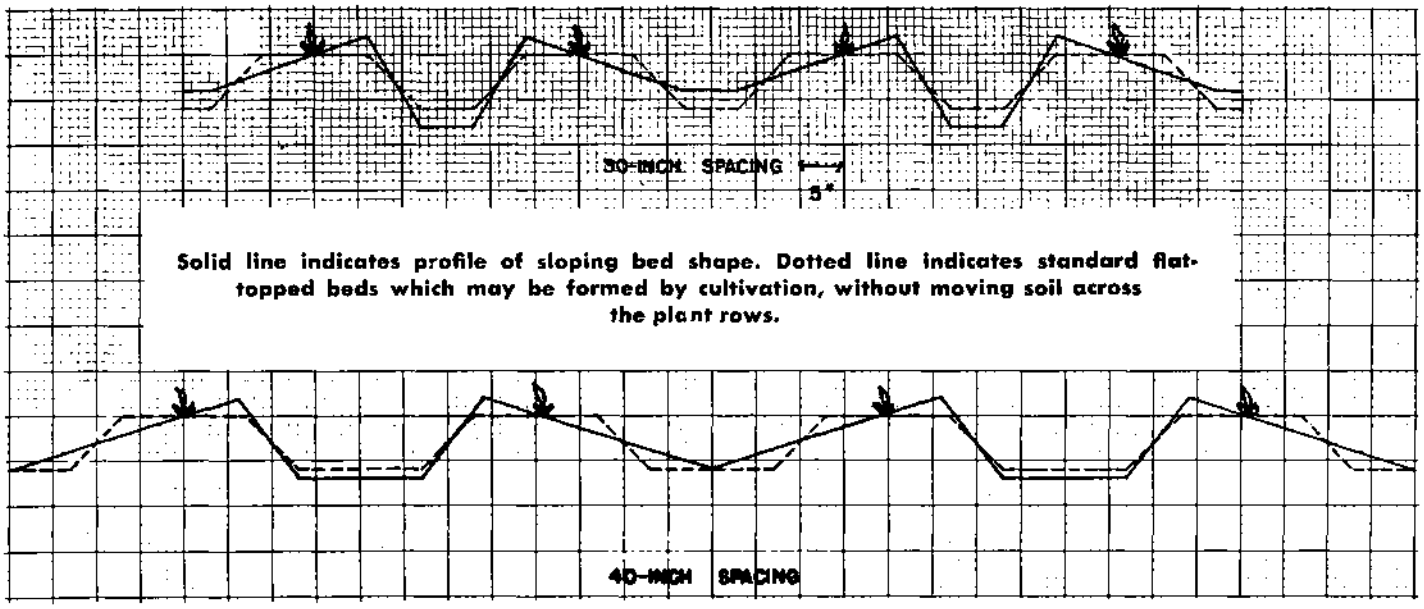
Sled designed for forming sloping beds was built by co-operator James Simons of Brawley, Imperial County.

The study reported above is part of the research being conducted by the Salinity Laboratory, United States Department of Agriculture, Riverside, California, and the University of California.

Sled built in Brawley for forming 40″ sloping beds.





Solid line indicates profile of sloping bed shape. Dotted line indicates standard flat-topped beds which may be formed by cultivation, without moving soil across the plant rows.