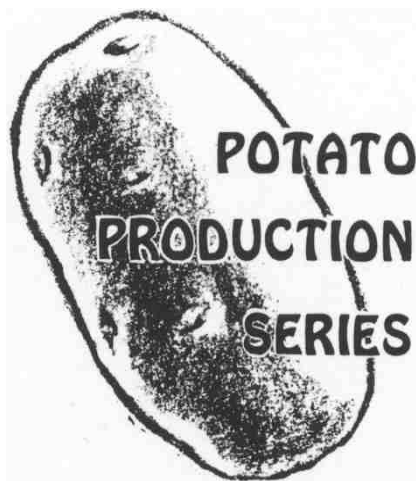


# POTATO PREPLANT TILLAGE PRACTICES

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It is essential to properly prepare seedbeds to develop maximum potato quality and yields. If good preplant seedbed preparation is neglected, even the best soils will produce inferior crops. Uniform sprout emergence and young plant vigor depend on a uniformly firm, porous, moist bed. Also, if a well-prepared seedbed is not provided, it is impossible to achieve a uniform planting depth.

Recent studies have shown that potato tubers can be predisposed to harvesting damage if certain soil conditions exist during the growing period. These conditions include soil compaction and poor aeration into and through the beds. The preplant tillage practices used greatly influence the amount of soil aeration and compaction existing late in the season. The following are major considerations in developing good seedbeds.

## PREVIOUS CROPS

The crops preceding potatoes are important for several reasons. It is best if the previous crop's roots penetrated to a greater soil depth than that needed by the potato plant. A good root system from the previous crop also improves water drainage and soil aeration. Small grains, among others, have proven beneficial in improving soil conditions.

Chop or shred plant debris as fine as economically feasible. Be sure to sufficiently incorporate this debris in the bed so that decomposition is reasonably

complete before planting the potato seed. Undecomposed organic refuse or debris may cause serious nutritional and quality problems. If this material is rapidly decomposing during potato plant growth, the micro-organisms can compete with the plant for nutrients. It can also cause external skin blemishes and increase the number of misshapen tubers. Excessive crop debris and heavily manured fields have been associated with increased potato scab (*Actinomyces scabies*) infestations.

The full extent of the previous crop's influence on potato diseases is not completely understood. Under certain conditions, alfalfa, beans, previous potato crops, and other broadleaved plants increase the incidence of *Rhizoctonia* disease. However, it appears that small grains reduce the occurrence of this disease to some degree.

If alfalfa was the previous crop, be sure the old crowns are dead before planting potatoes. Almost all alfalfa crops that are 3 or more years old are infected with alfalfa mosaic virus disease. When potatoes are planted, the new shoots coming from old crowns that are still alive will contain the virus and will be spread to the potatoes by aphids.

In the San Joaquin Valley, some green manure crops (such as soybeans) have been found to prevent potato scab buildup, but such crops can also cause an increase in soil borne *Rhizoctonia*.

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## SOIL MULCHING

Mulching the soil before planting is being practiced more and more. This is because mulching can greatly aid in thoroughly incorporating organic debris, fertilizer materials, and other chemicals. It is essential, however, that the potato bed be left in a loose, friable condition that will not tend to compact under the irrigation system used.

The mulching machine design, the manner in which the machine is used, and the soil type and conditions are important factors. Reducing or maintaining the soil bulk density (tightness) must be a consideration in any seedbed preparation practices. Also, using a mulching machine may create an undesirable plow sole at the bottom of the mulching cut.

## PRECISION TILLAGE

Although not in general use, precision tillage practices are being increasingly used in potato production. Pre-formed beds are established by using either a mulching machine or a lister and bed shaper. After establishing the beds, a chisel is run into the center of the bed—in some cases, to a depth of 18 inches. In the San Joaquin Valley and southern California, soil fumigants are often applied at this time. In northern areas, the soil may be too cool for effective fumigation during the early spring. This is why fumigants are usually applied during the fall when soil temperatures are warmer.

Other advantages of this practice include breaking up plow soles, which results in better water drainage and soil aeration.

## PLOWING AND DISCING

To prepare a good seedbed, stir or turn over the soil to a depth of 5 to 7 inches with a plow or disc or a combination of both. This breaks down the clods into smaller soil aggregates. However, excessively working the soil or working it when it is too wet may

lead to compaction, which can result in poor root and water penetration and reduced soil aeration.

When properly done, plowing and discing incorporate organic matter left from a previous crop, weeds, or green or animal manures, and loosen the soil to provide a seedbed that is uniformly firm around the seed yet still allows free air movement throughout the soil.

Harmful effects that may be encountered are: loss of moisture from the upper soil layers; poor structure and compaction if the soil is worked when too wet; and the formation of a hard, impervious plow sole. Plow sole formation can be greatly reduced by plowing at different depths each year, by chiseling or occasional deep plowing, and by alternating deep-rooted crops with potato crops.

## LEVELING

The principal purpose in leveling land for potato production is to provide a uniform topography that allows for equal water distribution to the crop roots in all parts of the field.

Under furrow irrigation systems, the land slope should provide sufficient fall for the water to move through the field at a rate that enables the irrigator to uniformly wet the soil to the depth of maximum root penetration without runoff or ponding. The desirable degree of the slope varies considerably, depending on the infiltration rate of the particular soil in the field. Most California potatoes are now being irrigated with sprinkler systems. Under sprinklers, leveling is only necessary to prevent water draining into low spots. If the system is set to deliver water at a rate that does not exceed the infiltration rate of the soil, little leveling is necessary. Applying water at less than the infiltration rate aids in maintaining soil structure.

When necessary, do leveling operations when the soil is dry enough to avoid destroying good soil structure and to prevent compaction.

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