SOME IRRIGATION PRINCIPLES AFFECTING POTATO PRODUCTION

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The total season requirement and daily amounts of water required by potatoes can be determined. Research work has proven many times that about 19 to 22 inches of water is needed for potatoes in central Washington. The exact amount varies year to year due to weather conditions.

Research workers are trying to determine when and in what quantities this water should be applied at each irrigation for highest quality. Professor Jensen's paper deals with this aspect of irrigation principles. His research shows the need to apply light, frequent irrigations.

WHY APPLY LIGHT IRRIGATIONS AND HOW DO YOU DETERMINE THE AMOUNT APPLIED?

Moisture used by plants is held as a film around soil particles. Fine textured soils such as silts and clays hold much more usable moisture than does coarse textured or sandy soils, because there is a greater area of moisture film. When an equal quantity of water is applied to equal quantities of freely drained silts and sands, sands will retain much less water. This can be demonstrated using either air-dried soil or glass beads of two different sizes.

Ironically soils holding the least amount of water are the ones easiest to fill and over irrigate, and the ones holding the most, quite often, are not filled to their potential, due to low intake rates. Therefore, we often have irrigation problems with both light and heavy soils.

Early in the Basin Project development it was difficult to get water through long runs on sandy soils, due to high intake rates. There were no major problems of moving water into the soil on our so called "heavier" soils. Now longer fields are possible on the light soils, but serious problems are being experienced of getting sufficient water into heavier soils. Potato growers moving here from Idaho and the Snake River Valley may be familiar with low intake rate soils due to so called "Slick Spots," or sodic conditions. Conditions experienced in the Basin are of a different type and are usually due to breakdown of soil structure and compaction. This breakdown and compaction has been attributed partially to the use of heavier farm machinery and to the lack of sound rotations.

An example of what compaction can do to water intake rates is shown in an experiment conducted by the University of California in 1957.

Treatment	Bulk Density (3-6 cm. depth)	Infiltration (Inches per hour)
Light Compaction	1.22	2.03
Moderate Compaction	1.55	1.09
Heavy Compaction	1.64	0.09

Jim Griffin, Grant County Extension Agent, has been making many infiltration measurements in the Quincy area in connection with reclamation of salted lands, in which the rates have been as low as .04 inches per hour.

This means that water would have to stand 50 to 75 hours to fill the soil with a two to three inch irrigation. Such problems are beginning to develop on many farms. Much digging is required to determine if moisture is moving in. Excessive runoff usually indicates low intake rates.

On sandy or high intake soils, as well as other soils, it would be well to determine occasionally how much water is being applied. If, for example, 20 inches of water is all that is required through a season, but 40 inches is being applied, undoubtedly money is being wasted on excessive fertilizer and water through leaching processes.

To determine inches of water applied: $\frac{\text{CFS X Hours}}{\text{Acres}}$ = Acre Inches. If a 40-acre field is irrigated every four days with one $\frac{\text{CFS, 1 X (4 X 24 hours)}}{40}$ = 2.4 inches is being applied.

Evaporation information published in local papers serves as guides to how much water is needed. Discrepancies may pinpoint soil problems and a need to change irrigation practices.

The physical aspects of applying water to the soil is an art, and most irrigation farmers are accomplished in this, but knowing how much water to apply and when to apply it is a science. Scientific irrigation is necessary if good farm management is desired.