

Press Releases

There is much pressure on growers to use just the irrigation water needed to satisfy the needs of the plants. This is essentially good advice -- except that it is necessary to apply a slight excess each year to prevent salts in the irrigation water from accumulating in the soil.

The more salt the irrigation water contains, the greater the excess needed to satisfy the leaching requirement. For instance, to raise salt sensitive crops with irrigation waters containing 1000 parts per million of salts would require a leaching requirement of 30 percent more water per year than the crop needs. For less salt sensitive crops perhaps only 10 or 15 percent excess irrigation is all that is necessary. Waters with only 500 parts per million salts would require half of this amount.

Pre-irrigations and early season irrigations would be a good time to get this extra water through the soil.

L. K. Stromberg
Fresno County Farm Advisor

233-2284

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Did you ever think of the amount of salt you add to the soil every time you irrigate? One of the hazards of irrigated agriculture is the accumulation of excessive salt in the root zone.

Excessive salt reduces the growth of crops. Some plants can tolerate more salt than others but all crops will be damaged if the amount of salt in the soil is great enough.

All irrigation waters contain some salt. River waters may be as low as 50 parts per million (ppm) while many wells contain 1000 to 2000 ppm!

Let's put this in plain terms. Water a foot deep over one acre weighs about 2,720,000 pounds. This means that one ppm of salt would be 2.72 pounds. Suppose you had a "good" well water that contained only 735 ppm. An acre foot of this water would carry 735 times 2.72 or one ton of salt!

We use about 4 feet of water each year for a crop of alfalfa. This means that you add 4 tons of salt to each acre each year!!

It takes a good irrigation system and careful irrigation management to keep from building up salts in the root zone without wasting water.

How much available water is there in a soil that has just been irrigated?

The moisture available for plants is the moisture between the field capacity of the soil and the wilting point.

About 2 or 3 days after an irrigation the wetted portion of the soil is at "field capacity." This is a reasonably stable moisture content that depends mainly upon the texture or the amount of sand, silt and clay in the soil.

The wilting point of the soil is that moisture still remaining in the soil when plants wilt and don't recover at night, or when the air is very moist. The wilting point also depends mainly upon the texture of the soil.

A sandy soil may have from $\frac{1}{2}$ to 1 inch of available moisture per foot of depth, while a clay ~~soil~~ soil may have 2 to 3 inches per foot of depth.

After an annual crop has been harvested, the soils are usually at or near the wilting point, so in the pre-irrigation for the next season you should replace the available moisture to a depth of 5 or 6 feet.

In a sandy soil this may only require 4 to 6 inches of water, while a clay ~~soil~~ may require 12 to 18 inches of water.

Too little water is poor farming and too much water is wasteful.

Get out the soil auger or shovel and check how deep your first irrigation set went into the soil, then use this as a guide for the length of time to irrigate the rest of your field.

Many growers don't measure their irrigation water -- this is a mistake.

Diverted water from canals is usually measured in cubic feet per second -- usually called second foot. One second foot flowing for one hour will cover an acre of land with one inch of water. So if you want to apply a 4 inch irrigation and have a second foot flow you can cover 24 divided by 4 or 6 acres in 24 hours.

The flow of pumps is usually measured in gallons per minute. 450 gallons per minute equals 1 cubic foot per second -- or flow of one gallon per minute will take 450 hours to cover an acre an inch deep.

With some simple calculations, you can easily determine how much water you are using each hour.

If you don't know the output of your pump, the power company or your pump dealer will be glad to make a pump test for you.

In fact, now that things are a little quiet with irrigation, it might be a good idea to have a pump test made. It could improve your irrigation efficiency next season.

Few of us realize how much water is needed to produce plants.

Several years ago many tests were conducted to measure water needs. It was found that for every pound of plant material above ground from 200 to 1000 pounds of water was needed.

Alfalfa, for instance, requires about 1000 pounds of water for one pound of hay. If you have a so-so crop of 6 tons per acre it would require 12,000,000 pounds or 1,600,000 gallons of water!!

If you consider cotton, the story is even more striking. To produce 2 bales or 1000 pounds of cotton per acre it requires 6,500 pounds or 870 gallons of water for each pound!!

The actual amount used in any one field may vary depending upon the wind speed, humidity, temperature and the management of the grower.

It is interesting to note, however, the amount of water used does not depend upon the kind of soil. Properly managed, a sandy soil does not require any more water than a clay loam soil.

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Most plants need well ventilated soils for best health and growth.

If the free movement of air between the soil and the air aboveground is restricted plants may slow down their rate of growth.

If the root zone is not well ventilated, the uptake of plant food and even water may decrease, and the plant may be more susceptible to diseases.

"Drowned" spots in the field are caused by a poorly designed irrigation system, faulty surface drainage, or applying irrigation water at a faster rate than it can be absorbed by the soil.

Slow rates of water penetration can be caused by alkali spots, poor quality water, tilling the soil too much or working it at the wrong time.

Poor irrigation management is more common than we like to believe. Next time you are riding around an irrigated area, notice the grassy ends of alfalfa, sugar beet and cotton fields -- this is usually caused by water standing too long after an irrigation.

Many growers could increase their usable acres by sprucing up their irrigation systems.

Improperly designed sprinklers may cause damage to citrus trees. This was shown by a University of California Farm Advisor from Orange County.

Tensiometers were installed to measure soil moisture in some groves suffering severe dieback. The data gathered proved that the rate of water application was greater than the soil intake rate -- this caused some temporary water-logging of the soil.

Some growers were able to correct the problem by changing the nozzle size while others had to change the entire sprinkler head and spacing.

The damage to trees and the additional cost of changing the sprinkler system could have been avoided if soil properties had been properly evaluated by the man who designed the system.

Remember, sprinkler irrigation is an excellent way to irrigate citrus, but only if the system is properly designed.

L. K. Stromberg
Fresno County Farm Advisor

Last week in this column the use of gypsum blocks as a means of measuring soil moisture was discussed.

Another way of measuring soil moisture is with a tensiometer. Tensiometers are particularly good in sandy soils and for crops requiring very moist soils.

A tensiometer is a tightly closed tube filled with water. On the end that goes into the soil is a hollow ceramic tip with porous walls through which water can move slowly. The end above ground is fitted with a vacuum gauge.

As the soil dries, it sucks water through the wall of the ceramic tip creating a partial vacuum inside the tube which can be read on the vacuum gauge. As the soil continues to dry out it creates greater and greater vacuum. When the soil is rewetted the water goes into the tensiometer and the vacuum gauge returns to almost atmospheric pressure.

This provides an accurate measure of soil moisture tension in the wetter ranges.

Tensiometers are in common usage among citrus growers -- and bear careful consideration among growers of other crops.

L. K. Stromberg
Fresno County Farm Advisor

(GYPSUM BLOCKS)

The problem of measuring the amount of moisture in the soil has plagued growers since the first man put water on crops. Many methods of measurement have been devised -- all of them have their advantages and disadvantages.

One method is the use of resistance blocks. These resistance blocks are made of two electrodes carefully spaced and imbedded in gypsum. (plaster of Paris plus water).

These blocks are buried in the soil with a wire led from each electrode to the soil surface. These are "read" with an instrument which puts a small amount of direct current across the electrodes and measures the resistance. The wetter the soil -- and hence the gypsum block -- the less resistance to electricity.

The readings then can be translated into soil moisture content.

These gypsum blocks have been used for years in research -- and now many progressive growers are using them to help determine crop water needs.

Gypsum blocks are useful in medium and fine textured soils -- but less useful on very sandy soils.

Next week we'll discuss tensiometers.

L. K. Stromberg
Farm Advisor
Fresno County

RELEASE IN FEBRUARY

Winter grains such as barley and wheat may need additional irrigations. Winter rains in many years may be adequate but in most years they are not.

Grains should have available moisture up through the dough stage to prevent pinching of the heads, and resulting in light, poor quality grain at harvest.

It's a good idea to check the deep soil moisture when the grain is in the boot stage. The soil at this stage of growth should be well supplied with water in order to carry the crop through. If there is any question in your mind that you may not have adequate moisture, an irrigation should be applied.

It's dangerous to delay an irrigation because an irrigation applied when grain is heading out may cause excessive growth and later severe lodging.

Don't guess about soil moisture -- measure it or at least dig some deep holes to check.

L. K. Stromberg
Farm Advisor

RELEASE IN MARCH

The pre-irrigation of cotton land is probably the only "good" irrigation the crop will get.

Without a crop on the land, you can leave the irrigation sets on long enough to wet the soil deeply without fear of drowning out plants.

For cotton the soil should be wetted down to 6 feet if the soil is that deep. Shallow soils should be completely wetted to the depth of the restricting layer.

A deep clay loam soil may hold as much as $2\frac{1}{2}$ inches of water per foot or 15 inches to wet it to 6 feet.

A loamy sand soil, on the other hand, may hold only $\frac{3}{4}$ inch per foot so that $4\frac{1}{2}$ to 5 inches may fill a 6 foot soil.

Remember, any water put in the soil during the pre-irrigation will be that reserve moisture to prevent sudden moisture stress during the hot summer months ahead when you "just can't get around fast enough."

RELEASE IN MARCH

Maximum yields of safflower in the San Joaquin Valley require about 36 inches of water. This is considerably more than was first thought a few years ago.

Water standing around the roots of safflower for any length of time after an irrigation makes the plants susceptible to root rot diseases.

Safflower is also subject to root rots if the plants are allowed to become stressed for water between irrigations.

Water can be safely applied if the soil is well drained and the water is applied frequently enough to prevent moisture stress.

Researchers in Arizona found that they produced maximum yields where a total of 42 inches of water was applied in 9 crop irrigations. This probably is not practical, but it does prove that proper irrigations will safely increase crop yields.

RELEASE IN MAY

If your soil is the least bit saline (salty) or if the irrigation water you are using has a fair amount of salt, you should take great care in irrigating a seedling crop or irrigating a crop up.

Salts tend to accumulate in the center of the plant bed and can damage a small plant.

You can reduce this salt accumulation by irrigating in every other furrow. This pushes the salt past the top of the bed and puts it on the shoulder toward the dry middle away from the tender seedling.

As a plant gets larger this salt is less damaging and furthermore, only a small portion of the total root system is in the center of the bed.

In a very salty situation you should consider using a sloping bed or a peaked bed, especially designed to keep the salts away from the tender young plants.

A well designed sprinkler system does not permit excessive salt accumulation in the top of the plant beds.

May release

An early irrigation for cotton and other row crops may be desirable this year. The rains have been very light and the weather warm since planting.

Because of the lack of early spring rains, salts may have accumulated in the centers of the planting beds if the pre-irrigation was made by furrows. In some places this has damaged the young seedlings.

An early irrigation on one side of the row or by sprinklers will move this salt away from the young seedling and permit it to grow off normally.

We'll have something more to say about later irrigation of cotton in a few weeks.

L. K. Stromberg
Farm Advisor
Agricultural Extension
(233-2284)

June release

Many growers are planting blackeyes this year for the first time. They are not difficult to grow but irrigations may be tricky. Even experienced growers sometimes allow the crop to get too dry between irrigations.

When blackeyes stress for moisture when they are setting fruit they may "cut out" and a later irrigation will start a vegetative cycle--so keep them growing! They need irrigating a little more frequently than cotton on the same soil. If you're on a 14 day cycle for cotton--irrigate blackeyes every 10 days--and the crop should grow normally and continue to set fruit over a longer period of time.

L. K. Stromberg
Farm Advisor
Agricultural Extension Service
(233-2284)