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Which Will It Be?

Drought and the talk of drought means we in agriculture must work to increase water-use efficiency through a better understanding of crop water use.

Summary: *Agronomists and crop advisors should promote those crops that require less water in those areas where water restrictions are likely to occur. This entails making sure their growers, especially in western irrigation areas, are well aware of the consequences of ignoring prudent practices that help conserve water.*

Water and water quality have always been the heart, life and soul of western agriculture. The need and concern for available water will never go away in an agricultural setting where land, irrigation water, and crop production are so closely tied. Water for agriculture and the quantities it takes for production are becoming an increasingly divisive topic within western communities. This has been especially true during the last three or four years where concerns about low water availability and increasingly higher demands for water have been voiced throughout the western states and provinces of North America.

The public within these western areas considers water issues as extremely important. Most people want clean drinking water, clean rivers, and plenty of salmon and other fish species. However, this same public, especially within urban settings, does not place equal priority on water use for agriculture. Those within these communities, who have plenty to eat, forget the absolute dependency on water of the very food crops they consume. While those of us in agriculture need to practice good stewardship of this precious resource, we need at the same time to remind our urban friends of the vital role agriculture plays in contributing to the well being of our communities and our neighbors (Canada and Mexico).

Increasing scarcity

As of this writing there are many areas in the west where snow pack is 30 percent below average. Many areas of the intermountain west (Colorado, Oregon, Idaho, and Washington) need 120 to 130 percent above average snow to have near "normal" irrigation for the 2003 growing season. If these snow pack levels are not obtained, the consequences will be serious.

Recent storms prior to the beginning of 2003 have provided the Cascades and Sierra Nevada ranges with good levels of moisture. However, the Northern Rockies are still 40 to 50 percent below average. Oregon hydrologist Jon Lee reports statewide snow pack at 29 percent of average, the lowest of any western state and one of the worst ever. More than half Oregon's 36 counties remain in a state of drought emergency.

Severe drought continues in Colorado. Tree-ring studies indicate that the present drought is the worst in 300 years. Within the Colorado River basin, flows have been the *lowest on record.* Because of concerns of insufficient water for urban areas, there are plans to tap water from surrounding states that traditionally has been used by agriculture. One proposal by a Colorado company envisions drilling wells in the Sand Hills of Nebraska, then transporting the water to Denver and surrounding cities. Nebraska Senator Ed Schrock recently remarked, "There will come a time when populated areas like those on the eastern slopes of Colorado will demand our water. The crops and livestock of Nebraska will take second and third place to these urban interests."

Some hopeful signs

According to national weather forecasters, the outlook for water availability through winter 2003 storms in some parts of the west is good. Highest probability is the continuation of an active storm track across the southwest U.S. "There is a classic earmark of El Nino's wintertime influence," explains Stu Ostro, senior meteorologist. "It has made its presence felt, and we see no reason why this won't continue." Other meteorologists are predicting that a zone of the west, which would include southern California, Arizona, New Mexico, and portions of Texas, will experience above-normal precipitation. However, because of El Nino's

traditional pattern, many places to the north (particularly the northern Rockies and portions of the Midwest) are not expected to have this degree of storminess.

Managing problem

Because of the limited flows of irrigation water and the needs for urban and environmental interests to continually look at alternative or expanded water supplies, long-term water management plans are needed. We can be thankful for the foresight of those who developed the reservoir storage capabilities of the west. There are many who might disagree with the building of dams, but those people would probably not even reside in the west if the present day storage had not been put in place. Despite the last three years of very low runoff, reclamation has been able to deliver enough water to meet all its water delivery commitments for both agriculture and urban populations within the lower Colorado River Basin. Without the dams in place, estimates show the Lower Basin water use would have been reduced by 60 percent and shortages close to 6 million acre-feet would have occurred.

Additional estimates show that it will be many years before the Colorado River system is full again. It would require an estimated 265 percent of average precipitation to refill the system. Even within a wet cycle and at present consumption, the Colorado River basin would take 2 to 5 years to fill. With limited snow pack predicted, the outlook for refilling these reservoirs is in serious doubt.

With that in mind, the federal government is taking steps to decrease the amount of water being used by states within the Colorado River Basin. California is by far the largest user. Secretary of the Interior Gale Norton recently signed an Annual Operating Plan. The plan allows changes in water use to take place beginning in 2003. Release rates were dependent on California signing a Quantification Settlement Agreement. Since this did not take place, the amount of water supplied to the Metropolitan Water District (Los Angeles County) will be at a level of 414,000 acre feet. This represents a significant decrease from the amount requested. This has put local water districts in a scramble to acquire additional amounts of irrigation water. Unfortunately, there are few districts with surplus water available.

Steve Beckley, director of the California Plant Health Association, has stated, "With the new water constraints, Sacramento North Water users will need to reduce rice production by an estimated 50,000 acres." There are additional examples of these types of reduction in acres, all of which impact not only agricultural production, but also the agribusinesses serving these communities.

Avoiding conflict

Within the 2003 irrigation year and beyond, there will continue to be conflicts between agriculture and other water users. While some of the conflicts will be won by agriculture, many will be lost. However, acknowledgment that water as a precious resource needs to be *shared* during times of plenty as well as times of drought is an attitude that will have to pervade the consciousness of both sides.

We in agribusiness, must work to increase the efficiency of water use through better understanding of crop water use. We must also take necessary measures to effectively use that portion of irrigation water available to agriculture and practice good agronomics that promote the best irrigation management practices. This includes a better understanding of soil moisture relationships to soil fertility and a better incorporation of soil moisture monitoring and interpretation of that information. Irrigation and overall water–use efficiency must continue to be emphasized.

Agronomists and crop advisors should promote crops that require less water in areas where water restrictions will be evident. Growers have been known to lease their water rights to down-stream water users. These types of actions result in land being taken out of production for one or more years. Crop advisors should make sure that these growers are well aware of those drastic consequences in subsequent production years.

By taking these steps and others we assure ourselves, as well as those we serve, with many years of continued production and economic success.

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Ten ways to increase water-use efficiency

THINK DEEP. High-yielding growers think about farming their soil 12 to even 18 inches deep. By chiseling down residue, they develop a deep soil profile in which to build organic matter and improve the water-holding capacity of the soil. The organic matter produced provides the soil with tilth, which in turn promotes root proliferation that absorbs water. A deep silt loam soil can store up to 10 inches of water. The water stored in this deep, spongy reservoir is *absolutely necessary* for producing a high-yielding crop.

LEAVE ENOUGH RESIDUE. In conservation-till, residue leaves a protective blanket. Residue controls erosion and reduces soil runoff. It also increases infiltration rate, allowing more rain to soak into the soil. Approximately 30 to 40 percent of the rain in the Corn Belt is from thunderstorms. These heavy downpours can be absorbed by residue. In 1960, when the average corn yield harvested was 56 bu/A, only 1.5 tons of surface residue remained. With 170 bu/A yields, however, the quantity rose to almost 4 tons! Of this, a smart grower will use 2 tons for surface erosion control, etc., and incorporate the balance into the soil to produce organic matter that builds soil tilth and productivity.

MOTHBALL YOUR MOLDBOARD or donate it to a museum. The moldboard plow, once great as an implement for pioneers to break up the prairies, is obsolete in modern agriculture. Moldboard plowing dries up the soil, wasting valuable water. In addition, exposed soil is subject to oxidation and loss of equally valuable organic matter. There are tools that till soils yet leave a protective surface blanket.

AVOID STRATIFICATION. Soil test for nutrients, especially those immobile ones (P and K) that may accumulate in the upper layers of soil. Shallow root systems could result. During July and August, when dry hot days can cause moisture stress, deeper root systems can withstand longer periods of these dry, hot spells. Also test for sulfur and zinc.

COLLECT SNOWFALL. If you farm in northern areas, chances are you will receive 2 to 4 inches of water as snow during winters. Sufficient residue soaks up this water and prevents its runoff in the spring. Remember: conserving this water in your soil reservoir may equate to a 2-inch rain during a dry July!

PLANT EARLY. For corn growers, planting early might put your pollination *ahead* of the hot days that often occur in mid-July. Studies have shown that four days of moisture stress during pollination in mid-July can reduce yields 50 percent, whereas a similar four-day stress during the 40 days after crop emergence will cut yields only 10 percent! In addition, a good corn starter will combat low soil temperatures that can reduce N, P, and K uptake during cool springs.

FERTILIZE ADEQUATELY. You'll increase root exploration deeper into the subsoil. Many studies have shown where roots of fertilized crops have penetrated two feet deeper into the soil than those without fertilizer, resulting in water extractions exceeding four inches. Crop canopy also increased, reducing soil surface evaporation, allowing more water to seep into the soil. Research also shows that better nutrition produces more extensive root systems, which harvest more available water.

PLACE P AND K DEEPLY. Root zone banding (RZB) and dual placement of liquids with ammonia are two ways to deep-place fertilizers. This is especially important when the top 2 to 3 inches of soil dries during hot summers and nutrient uptake is jeopardized. Iowa studies surveying moisture-stressed fields have shown that the plants of nearly every field were P deficient.

CONTROL WEEDS. We all know weeds compete with plants for available moisture. Enough said.

INCREASE POPULATIONS. Research shows that optimum populations increase water-use efficiency. So will narrow rows, and using the right hybrids. Generally speaking, the resulting high yields produce more bushels per inch of available moisture. Ample documentation exists on growers who have obtained up to *11 bushels of corn per inch of water!*