Field Notes
June 6, 2006
Johnny Saichuk

Before I get into current topics I ran across an old reference to the use of grains per gallon as a term to express the salinity of water. The term “grain” is a unit of weight. There are 7000 grains per pound. Grains per gallon has been used to express the hardness of water and many of the old home test kits for water softeners used the term. Hardness is caused principally by calcium, magnesium, iron and manganese. In home water softening systems sodium is added to the water to counter the effects of these elements. From this use the term grains per gallon became a means of expressing the salinity of water. I still have not found the origin of the 7000 grains so it could be a grain of sand or a grain of sugar for all I know.

Some more information that might be helpful in determining irrigation costs follow.

Horsepower to Raise Water

$$\text{Horsepower} = \frac{\text{gallons per minute X total head in feet}}{3960}$$

Cost to Pump Water (Electric)

$$\text{\$ per hour} = \frac{\text{gallons per minute X head in feet X 0.746 X rate per KWH}}{\text{3960 X pump efficiency X electric motor efficiency}}$$

(70% pump efficiency and 90% motor efficiency is a good average)

Cost to Pump Water (Gasoline and Diesel)

$$\text{\$ per hour} = \frac{\text{gallons per minute X head in feet X K X \$ per gallon of fuel}}{\text{3960 X pump efficiency}}$$

K = 0.110 for gasoline or 0.065 for diesel (K is actually gallons of fuel per horsepower)

70% pump efficiency is a good average

These formulas were obtained from the Pocket Reference compiled by Thomas J. Glover.

The use of term “grains per gallon” is also mentioned in the same text along with about a dozen other terms to express water hardness.

The other term we have used regularly in discussions of both water and soil salinity has been parts per million (ppm). None of the portable meters commonly used measure either of these directly. Instead they all measure the ability of the water to conduct electricity. The more salt present the higher the conductivity. The faces of the meters show the units and the meter mechanism is calibrated for the unit to be expressed.

Last week we looked at a field showing an irregular pattern of injury following a Grandstand application. The plants above show the typical symptoms of excessive tillering, swollen bases and twisting or curling of the tillers. Often we also see dead leaves which are the consequence of axillary buds (buds in the area at the junction of the leaf sheath base and the stem) beginning to grow and literally pushing the adjoining leaf away from the stem. This farmer has used Grandstand successfully many times in the past. In this case he applied the herbicide to a rice field on very heavy clay soil that was dry and cracked. He waited the prescribed 72 hours before flooding then added water. The water carried the herbicide directly to the root systems resulting in injury. The injury was greatest on the driest parts of the field where the soil was cracked most.

Several years ago a similar problem occurred on grain sorghum where 2,4-D had been applied post direct. No injury symptoms followed the herbicide application until the field received rain several weeks later. Again the soil was severely cracked because of drought conditions at the time of application. Rain carried the herbicide down to the roots causing injury symptoms. The plants eventually grew out of the injury.

In the case of this rice field the injury was not extreme and recovery is expected, but the differences in various areas of the field caused concern.

Above are three photographs of a grass I have seen many times around the edges or in ditches along rice fields, but never in a rice field before. As can be seen it has narrow leaves, is bluish green rather than the yellowish green of rice and has an extensive rhizome system. The field was in soybeans last year and rice was no tilled into it this year. The ligule resembles the ligule of creeping river grass (aka perennial barnyardgrass). When I finally found an inflorescence it was obvious what it was. The farmer then said it had been brought to his house in flowers and every time his wife pulled it up she tossed it out on the edge of the field. I was called to take a look at it because Clincher had been applied without result. The panicle in the lower left photograph should give you an idea of the name of the grass.

If you have ever wondered why some apparently tender weeds are difficult to control the common salvinia in the above right photograph shows it well. The extensive Velcro-like hairs on the leaf surface of salvinia keeps the droplets of water suspended above the leaf surface. If these droplets contained herbicide they would have little or no effect on the plant. The leaves you see are about the size of a dime.

Sometimes green ring is not green. In the photograph above internode elongation (the more correct term for green ring) has begun as is evidenced by the increased distance between the septae (white things) above the crown. There is no green band or green ring because there is no chlorophyll accumulation. There is no chlorophyll accumulation because it was below the soil line which is clearly delineated in the reverse side of the same stem shown at left. Above the soil line is green below white.

The grass mentioned at the beginning is Torpedograss (*Panicum repens*).