TEXAS

Research Tracks Potassium Dissipation Patterns in Rice Production

By Garry N. McCauley

Water quality and the potential impact of agricultural practices on water quality are among the most compelling environmental issues facing our society. People are concerned about the water they drink, its safety and what is being done to protect its quality. Unfortunately, what they read, hear and see is often confusing...and not always based on good science.

Most Texas rice production is concentrated in areas near the Gulf Coast. Flood waters leaving rice fields can impact on surrounding areas, including coastal waters. This study was established to evaluate the environmental impact of nitrogen (N), phosphorus (P) and potassium (K) fertilization of rice grown under flood management. An earlier article (BC, Vol. 79, No. 3, 1995) dealt with P fertilization. This one discusses K.

Earlier small plot research conducted by Texas A&M University scientists showed that with proper pesticide and water management there is little potential for non-point source runoff from rice fields. However, those studies are more than 20 years old and did not include P and K fertilization as variables.

This study was designed to define the degradation patterns and estimate non-point source runoff of P and K.

Twenty producers in a four-county area (Colorado, Jackson, Matagorda and Wharton) were recruited by county Extension agents to participate in the study. Producers took a water sample at the inlet and outlet of each test field following each rain and flush irrigation. Following flood establishment, inlet and outlet samples were taken when the flood reached the bottom of the field and at three day intervals until four samples were taken or at least 12 days after establishment. It was assumed that K (and P) would be dissipated from flood water within 12 days after the flood had reached the bottom of the field.

The 20 producers took a total of 220 samples at 116 different times. There were 104 matched inlet and outlet samples, with 12 outlet samples being taken when no inlet water was available.

Little is known about the levels and impact of K on the environment. It has not been considered to be of any potential damage to the environment or to human health as a result of crop fertilization. Potassium concentrations in all samples taken by farmers participating in this project were rather low. No samples tested contained more than 8.0 parts per million (ppm) K. The only one testing that high was an inlet sample. Sixty percent were non-detectable (less than 0.1 ppm).

Samples were divided into seven groups to allow for detailed interpretation (**Table 1**). Groups A through E can only be interpreted to have a neutral or positive environmental impact. Group F could possibly be a negative environmental factor, the magnitude depending on the amount of concentration increase and whether any such effect of K had been established. The

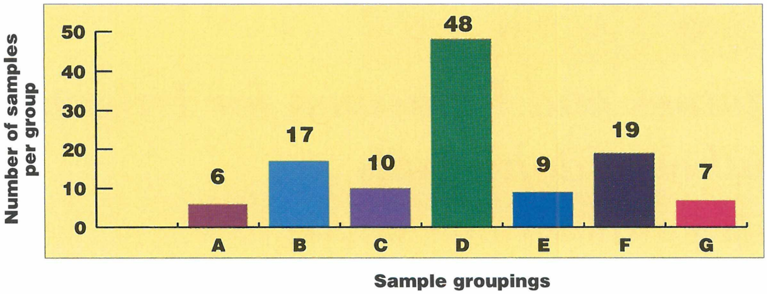

FIGURE 1. *Distribution of inlet-outlet sample change in K concentration for 116 rice field water samples.*

impact of G group can not be determined because there was only one sample taken, but it is assumed to be negative (conservative interpretation).

Figure 1 characterizes the sample distribution for K. Ninety of the samples, 78 percent of the total, were in groups A through E (no environmental impact). Nineteen of the samples increased in concentration, while seven outlet samples...with no matching inlet sample...had detectable concentrations.

Figure 2 presents the distribution by sample increase. Of the 26 that increased in K concentration, 15 increased by only 1.0 ppm, another six by 2.0 ppm. Of the five samples that appeared to increase by more than 2.0 ppm, two were outlet samples with no inlet partner with which to make comparisons. All were samples from the first water to be applied to a field after a preplant K application. Two of the five samples were from fields that received no K fertilizer.

TABLE 1. *Seven water sample groups used to determine potential effects of K fertilization.*

A = No inlet—outlet non-detectable
B = Concentration declined to non-detectable
C = Concentration declined, still detectable
D = Inlet and outlet samples non-detectable
E = Detectable levels—no change
F = Concentration increased
G = No inlet sample—detectable level in outlet

In summary, K in rice field runoff was less than 9 lb/A per season and presented little or no environmental threat. Further, there was no correlation between K in runoff and fertilizer K. In fact, some of the fields which received no K fertilizer had some of the highest seasonal losses. BC

Dr. McCauley is Associate Professor, Texas A&M University System, Eagle Lake, TX.

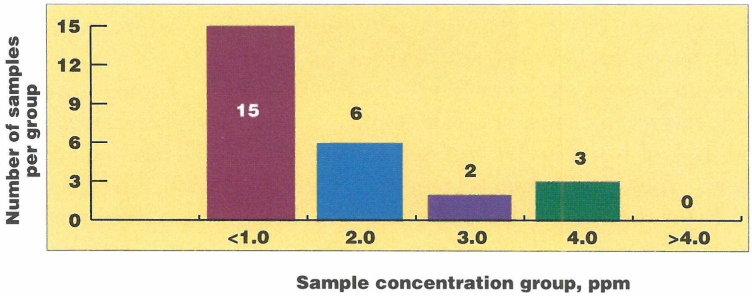

FIGURE 2. *Distribution of K concentration increase from inlet to outlet for 26 rice field water samples that increased.*