Evaluation of Salt-tolerant Forages for Sequential Reuse Systems

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Executive Summary

Reuse of saline drainage water is a management option on the west side of the San Joaquin Valley (SJV) that is necessary for reducing the volume of drainage water (San Joaquin Valley Drainage Implementation Program, 2000). A major limitation of in implementing a "sequential reuse" system, a method that shows considerable promise is identifying appropriate crops to include in the reuse sequence. Particularly useful are crops that could grow well under saline (ECe 10dS/m) to extremely saline (ECe>30 dS/M) conditions. High quality forages for dairy cattle, beef cattle, and sheep are in short supply in the Central Valley. There are a number of salt-tolerant forages that may play an important role in reducing drainage water volumes in the San Joaquin Valley while at the same time producing a food source for sheep and dairy cattle. Their actual suitability for sequential reuse systems, however, will depend upon their production potential under saline-sodic conditions and their resulting forage quality. Evaluation of forage quality not only depends upon the standard quality parameters such as crude protein and acid detergent fiber, ADF, but also needs to consider the accumulation of selenium and molybdenum in the tissue.

A controlled study is needed to evaluate a number of promising forage crops as suitable candidates within sequential reuse systems. Sand culture systems are particularly suitable for screening crops because one can produce controlled and uniform salinity profiles, a condition necessary for comparing and ranking potential crops. Experiments will be conducted at the US Salinity Laboratory in Riverside using large outdoor sand tanks. These tanks have proven useful in the successful evaluation of other crops and trees. A number of forages will be evaluated in terms of forage potential and forage quality. We intend to test a number of potentially useful halophytic forages which may include species such as Bermuda grass, 'Salado' alfalfa, Perla grass, Puccinellia grass, Jose tall wheatgrass, Creeping wild rye, Alkali sacaton and Salt grass. Forages will be irrigated with synthetic drainage water with an EC that ranges from 8 to 30 dS/m. Forages will be cut periodically to simulate grazing or cuttings. Plant material will be analyzed for mineral content, trace elements, and the standard forage quality parameters.

An interdisciplinary research project is proposed involving scientists from the University of California, USDA-ARS, and Cal State University Fresno. The team members have expertise in soils and irrigation management, plant physiology, salinity and plant nutrition, and ruminant nutrition. Collectively they are well-qualified to assess the performance of these forages based on production and quality under a range of drainage water salinities.