CENTRAL PLAINS IRRIGATION SHORTCOURSE
POSTER ABSTRACTS

CHEMIGATION IN KANSAS

Marc R. Anderson, Ecological Specialist
Kansas State Board of Agriculture

Chemigation is a process whereby insecticides, herbicides, other pesticides, fertilizers, micronutrients or other chemicals or animal wastes are added to irrigation water which is applied to land or crops or both through an irrigation distribution system. Passed in 1985, the Kansas Chemigation Safety Law is designed to provide growers with a reasonable set of chemigation guidelines aimed at protecting the groundwater of the state.

IRRIGATION SOFTWARE FOR PERSONAL COMPUTERS

Norman Klocke, Extension Water Resources Engineer
University of Nebraska

Three irrigation software packages will be demonstrated at this booth. First, PC-IRRIGATE, which is user friendly irrigation scheduling software, will be available. It is based on the "checkbook" approach to scheduling. It requires inputs of field soils specifications, regional ET, local rainfall and irrigation. It can be updated with current soil water information from the field. Current soil water status and irrigation projections are outputs of the program. Second, PC-RUNOFF, which is software to predict runoff from a variety of sprinkler package, system capacity, soil texture, and slope combinations, will be demonstrated. The runoff from different sprinkler packages will be simulated. Third, PC-PUMP, which projects the economic impact of alternative fuel sources with ranges of fuel costs, will also be available. Payback feasibility for different alternatives are calculated. Demonstrations and consultations with irrigation specialists will be available at this booth.

TILLAGE MANAGEMENT FOR SPRINKLER IRRIGATION

Freddie Lamm, Research Agricultural Engineer
KSU Northwest Research-Extension Center

In this study, corn production was compared under four different tillage systems (Conventional chisel in fall followed by spring disking, Conventional plus corrugation at corn layby, Convention plus furrow dams at corn layby, and No tillage) for both impact and spray nozzles. Irrigation amounts were the same for each sprinkler package at 1.5 inches/event and the system capacity simulated a 575 gpm center pivot covering 125 acres. The results from the study indicate controlling runoff is a key area in optimum management of center pivot systems. In general higher yields were obtained with the spray nozzle system as long as runoff was controlled by surface modification or residue management. However, in the absence of runoff control the impact sprinkler was much better. Furrow damming has increased yields by an average of 3 to 12 bu/acre for the impact and spray systems, respectively.

DRIP IRRIGATION FOR CORN PRODUCTION -- THE RESEARCH APPROACH IN WESTERN KANSAS

Freddie Lamm, Research Agricultural Engineer
KSU Northwest Research-Extension Center
Bill Spurgeon, Research Agricultural Engineer
KSU Southwest Research-Extension Center
Harry Manges, Agricultural Engineer
KSU Department of Agricultural Engineering
Danny Rogers, Extension Agricultural Engineer
KSU Department of Agricultural Engineering

Kansas State University is currently conducting a major research effort at evaluating buried-line drip irrigation for corn in western Kansas. Over $250,000 of financial resources available to the Kansas Agricultural Experiment Station has been devoted to this effort, not including faculty and staff time. The research thrust is multidisciplinary, including agricultural engineers, agronomists, and agricultural economists. The drip irrigation systems at Colby and Garden City, Kansas are designed expressly for research and cover nearly 25 acres, consisting of over 225 separate field plots. Efforts currently underway are evaluating the water requirement of drip irrigated corn, the frequency of drip irrigation events, determining the uniformity of irrigation on long dripline laterals, evaluating spoon-feeding of nitrogen to the crop through the driplines, determining water redistribution and percolation under drip irrigation, determining the optimum spacing of the driplines, determining the optimum plant population for drip irrigated corn and determining the overall economics of the practice.

EMERGENCE PATTERNS AND SOIL TEMPERATURES OF RIDGE PLANTED CORN

David C. Nielsen, Research Agronomist
USDA-ARS
Steven E. Hinkle, Research Agricultural Engineer
USDA-ARS

Shorter season maturity crops must be grown at higher elevations because of cooler nights which result in less seasonal thermal heat units. Shorter maturity crops have less yield potential which reduces average grain yields and farmer profits. However, higher elevations also exhibit greater solar heat gain at the soil surface. The objective was to discover the soil temperature patterns and emergence differences between ridge-planted corn and corn planted on flat soil. If faster emergence is possible due to warmer soils on planted ridges, then slightly longer season maturities with better yield potential may be grown. Significant greater temperatures existed in the planted ridges, then slightly longer season maturities with better yield potential may be grown. Significant greater temperatures existed in the planted ridges, but there was no increase in emergence rates. There was also no difference due to direction of the ridges. Residue cover did delay emergence by one day in flat no-till plots where the corn was planted directly into the standing stubble. These findings show that a negative effect of elevation could not be counteracted by a positive elevation effect, and that soil profile shape had no effect on emergence and crop production with no financial benefit to farmers.

POST-CORN HARVEST SOIL WATER SURVEY FOR NORTHWEST KANSAS

Danny Rogers, Extension Agricultural Engineer
KSU Department of Agricultural Engineering
Freddie Lamm, Research Agricultural Engineer
KSU Northwest Research-Extension Center

A post-corn harvest soil water survey was conducted in northwest Kansas for the three years 1988-90. The mean available soil water in the 5 ft soil profile was 69% of field capacity for the 82 sprinkler- and surface-irrigated fields sampled. The results emphasize, preseason irrigation is generally not necessary for irrigated corn.

LEPA IRRIGATION MANAGEMENT FOR KANSAS

Bill Spurgeon, Research Agricultural Engineer
Tom Makens, Agricultural Engineer
Both from KSU Southwest Research-Extension Center
Danny Rogers, Extension Agricultural Engineer
KSU Department of Agricultural Engineering

Three studies have been conducted using Low Energy Precision (LEPA) nozzles. One study investigated the effect of 3.5, 7, and 10 day irrigation frequencies and irrigation amounts of 0.4, 0.7, 1.0, and 1.3 times ET on corn yield. High frequency did not reduce yield, therefore smaller amounts and higher frequency could be used to with smaller wetted diameter nozzles to minimize runoff. Overirrigation by 30% did not increase yield. Another study involved comparing the flat spray and bubble modes in conjunction with ripping, diking, and diking with ripping on slopes ranging from 1 to 6%. Irrigation amounts were between 0.75 and 1.0 inches. The flat spray mode reduced runoff significantly and resulted in the highest yield (222 bu/a). Diking with ripping produced the highest yield of the bubble mode (187 bu/a). Another preliminary study was a in-canopy flat spray nozzle spacing study. LEPA nozzles in the flat spray mode were placed at a height of 2 ft on a 5 ft spacing. Senninger Low Drift Nozzles (LDN) were placed at the same height on a 10 ft spacing. Corn yield (205 bu/a) for one season was not different for the spacing treatments. There appears to be good potential for the wider spacings in the canopy but more data needs to be collected to be conclusive.

WATER QUALITY--IRRIGATION AND NITROGEN MANAGEMENT

C. Dean Yonts, Extension Irrigation Engineer
Panhandle Research and Extension Center

The quality of our ground water supply is of concern to everyone. Nitrogen that is applied in excess to crop needs is a contributor to degradation of ground water quality. However, excess irrigation water applied beyond the soils capacity to hold the water is the mechanism by which nitrates are moved through the soil and to the ground water supply. The key in avoiding problems, or finding a solution once a problem exists is through the use of proper irrigation and nitrogen management practices.