Sprinkler Evaporation Losses

May Be Reduced By Nozzle Change

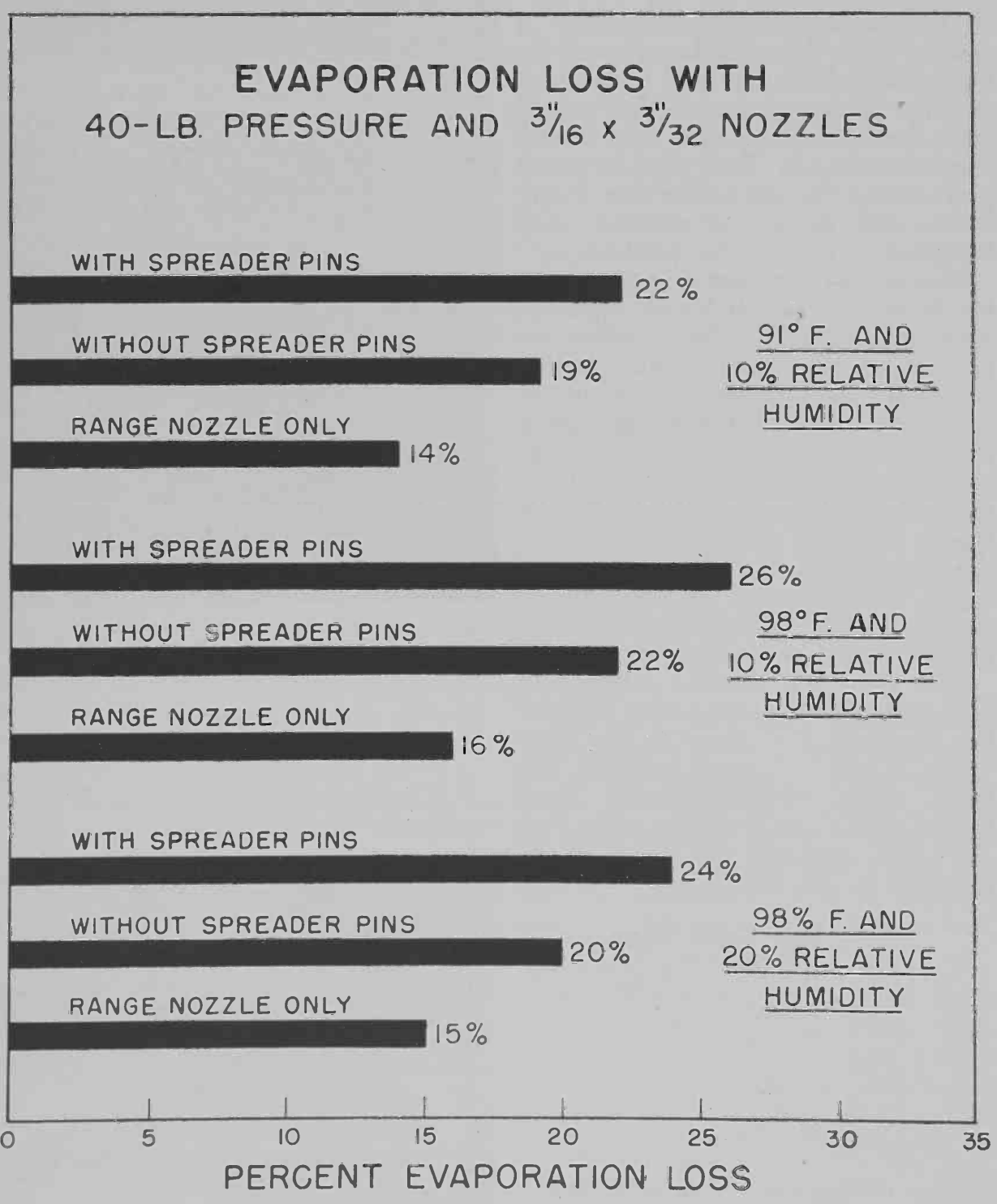
Short-staple cotton grown on unleveled gravelly sandy loam with sprinkler irrigation using approximately 30 acre-inches per acre per year. Sprinkler heads are spaced 30 feet apart, operating with range nozzle only.

H. C. Schwalen and K. R. Frost
Agricultural Engineering Department

All water losses in the irrigation of crops are especially important in the Southwest in view of a limited water supply. The use of the sprinkler method of application results in relatively high evaporation losses because of the large water surface area exposed to the atmosphere.

These losses bring no benefits to the farmer and rancher but directly increase his pumping costs. They also decrease the available soil moisture if there is a deficient water supply.

Many different crops in Arizona have been irrigated by the sprinkler method with apparently good results, though acreages are not large. Crops now being grown under sprinkler irrigation include vegetables, grain, cotton, pasture crops, orchards and vineyards. Areas having rough terrain, light soils or a small continuous water supply can produce crops with a sprinkler system which would otherwise be extremely difficult to irrigate.



Losses Studied

The Agricultural Engineering Department of the University of Arizona has been investigating the effect of various factors on sprinkler exaporation during the past few years. Part of this study has been to determine the influence of nozzle sizes and arrangements on evaporation losses. These losses may be reduced by nozzle changes which produce a larger and more uniform droplet size with the elimination of fine spray. The latter is very susceptible to both evaporation and wind drift.

Three nozzle arrangements are now being used in field practice. These arrangements are (1) the double-nozzle sprinkler with spreader pin (standard equipment), (2) double-nozzle type without pin and (3) the range or large nozzle only. Can worthwhile savings be obtained by converting the first arrangement into either of the others which eliminate fine spray?

Input, Output Measured

Tests were made by measuring the input to the sprinkler with a calibrated meter and measuring the discharge which reaches the ground surface in several hundred rain gauges. From the latter measurements the total amount of water reaching the ground surface is computed. The difference between the metered input

(See Next Column)

Partial List Of Suggested Plants For Southern Arizona

(See Page 4)

(Check with your local nurseryman)

Trees:

Front Yard	Citrus
	So. African Sumac (Known to the Nursery trade as Rhus. lancea.)
	Bottle tree
	Arizona Ash
	Olive
	Apricot
	Palo Verde
	Mesquite
Back Yard	Eucalyptus
	Hackberry
	Silk Oak
	Carob
	Palms
	Fruit and nut trees including Citrus
	Deodora Cedar
	Arborvitae
	Arizona Cypress
	Allepo Pine
	Canary Island Pine

Shrubs:

Foundation	Santolina
	Euonymus
	Myrtle
	Cassia
	Cotoneaster
	Boxwood
	Bird of Paradise
	Pittosporum
	Plitzer Juniper
	Floribunda Roses
	Jasmine
	Lantana
	Wax Leaf Privet
	Nandina
	Spanish Broom (Dwarf)
	Viburnum
	Texas Ranger
	Tamarix Juniper
Masses (Large Shrubs)	
	Oleander
	Pyracantha
	Sour Orange
	Japanese Privet
	Bottle Brush
	California Holly
	Arborvitae
	Arizona Cypress
	Crepe Myrtle
	Pomegranate
	Spanish Broom
	Bird of Paradise (Native)
Hedges	
	Japanese Privet
	Oleander
	Citrus Bouquet
	Roses
	Texas Ranger
	Euonymus
	Pomegranate
	Sour Orange
	Pittosporum
Lawns or Ground Covers	
	Bermuda
	Flawn
	St. Augustine
	White Dutch Clover
	Perennial Rye
	Kentucky Blue Grass (Shade areas only)

Sprinkler Evaporation

(From Page 10)

and the computed delivery on the ground is the evaporation loss in the air and this loss is expressed as a percentage of the input.

The comparative results shown in the accompanying chart are from tests of the three different nozzle arrangements previously mentioned and were conducted at two different temperatures and humidities during the bright sunlight hours in the middle of the day. The tests were made with the sprinkler heads set in a row to approximate field conditions, with a pressure of 40 pounds per square inch at the nozzles and with wind velocities of less than 4 miles per hour. The sectional area between two sprinklers was used for determining the catch in rain gauges and thus the overlap from two adjacent sprinklers included.

The chart indicates that the percent loss may be reduced from 3 to 4 percent by the elimination of the spreader pin, and by from 8 to 10 percent by the use of only the range nozzle in comparison with the use of the two nozzles with spreader pin. This represents a saving of from 12 to 16 gpm and 32 to 40 gpm respectively with a pump capacity of 400 gpm. The losses indicated on the chart are for bright daylight conditions near noon and thus the savings in water over the entire daylight period may actually not average more than one-half the values given above.

Evaporation losses from test runs made with complete cloud cover were about two-thirds of those shown on the chart for the same air temperatures and relative humidities.

Agricultural Hands Across the Sea

(From Page 2)

able to the programs of American Land-Grant Colleges. When this goal is reached, outstanding graduates may then enroll directly in American graduate colleges without further undergraduate training.

Many Colleges Cooperate

In joining hands with Abu Ghraib College, the University of Arizona has aligned itself with a number of other colleges and universities in the United States that are participating directly in our national policy of technical collaboration with other areas. The University of Illinois is working with India, Utah State Agricultural College with Iran, Purdue University with Brazil, Michigan State College with Colombia, the University of Arkansas with Panama, the University of Wyoming with Afghanistan, Oklahoma A & M College with Ethiopia, and Cornell University with the Philippines.

Technical Help

The American educational institution makes available the special technical skills needed by its sister institution abroad. The salaries, traveling and living expenses of technicians dispatched are paid by our Federal Government (usually the Technical Cooperation Administration — Point Four — of the Department of State, or the Mutual Security Agency.) The recipient country provides apprentice employees to work with our scientists, working space, equipment and supplies and all of the financial and other assistance that it can put behind the American group.

In Iraq the program is especially favored by the existence of a Development Fund established from oil revenues by the Iraqi Government for the general purpose of fostering the general development of the country. Since Iraq is largely an agricultural country, it is expected that agriculture will share favorably in the dispensations of the Development Fund.

Representatives Named

The agriculturalists who will rerpresent the University of Arizona's College of Agriculture in the Land of the Tower of Babel and the Hanging Gardens of Babylon are: Ian A. Briggs, Agronomist and Chief University Representative; D. S. Buchanan, Dairy Scientist; George B. McLeroy, Geneticist and Animal Husbandman; and S. C. Vandecaveye, Soil Scientist.