WATER CONSERVATION OPPORTUNITIES IN THE NURSERY AND TURF INDUSTRIES

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INTRODUCTION

The Apalachicola-Chattahoochee-Flint and the Alabama-Coosa-Tallapoosa River Basins (ACF/ACT) cover over 42,400 square miles of parts of Alabama, Georgia, and Florida. As such, the water resources of these basins have been at the core of a tri-state dispute over water use among the three states. As part of a large study that examined water demand in these basins, a survey was conducted to estimate water use and conservation opportunities for nurseries and turf farms in the 59 counties in Georgia (Figure 1) that are in the two basins (Comprehensive Study Technical Coordination Group, 1992).

Georgia's commercial nurseries and turf farms in the ACF/ACT study area were surveyed in the spring of 1993. Each firm was sent a survey in May with two follow-up letters and surveys in early and late June. Those firms still not responding were telephoned in July 1993. Of the 348 nurseries in the study area, responses were collected from 315, or 91%. Out of the 315, 99 nurseries used water supplied exclusively by a public water utility. Of the rest, 10 firms were no longer in business and we were unable to contact 23. Of the 35 turf farms in the study area, data were collected from 19 farms. Six surveys were returned because the farm was out of business and nine used water exclusively from a public source.

WATER USE

During 1992, the Georgia Basin was home to 119 container nursery operations. These operations covered 190 acres, all of which were irrigated. The primary source of water for 86 of the 119 operations was ground water. Container operations used water every month of the year. The seasonal distribution is heaviest, however, in the six-month period between May and November, during which an average of 10 inches per acre per month were applied. It is estimated that container operations use an average of 85 inches of water per acre per year, for a sample total of 1.2 million gallons per day (mgd) in 1992. The Georgia Basin had 131 greenhouse operations occupying 47.5 acres. Producers indicated that 100% of the greenhouses were irrigated. Greenhouses used an estimated 115 inches of water for irrigation per acre per year. The estimated greenhouse water demand in 1992 was 390,000 gallons per day. There were 86 field nurseries operating in the Georgia Basin during 1992. These operations covered 1,995 acres. Seventy-four percent of the field nursery operators responded that their water came from ground sources. Additionally, producers indicated that 100% of the 1,995 acres were under irrigation in 1992. Annually, field nurseries use approximately 10.5 inches per acre per year. This produces an estimated water use of 1.56 mgd in 1992. Container, greenhouse, and field nurseries collectively occupied 2,232 acres in 1992, with 89% in field nurseries.

The 1992 water use for nurseries collectively was 3.15 mgd. Even though nurseries are irrigated year round, 85% of this water application occurs between the first of May and the end of November.

The 19 respondents to the turf survey grew a total of 3,964 acres of mostly Bermudagrass, some Fescue, and warm season grasses (Centipede, Zoysia, St. Augustine). Results indicated that all acres in turf production during 1992 were under irrigation, with producers using 6.87 million gallons per day (mgd). Approximately 23.25 inches of irrigation water per acre is applied annually. An estimated 59% of the irrigation systems in use for turf operations during 1992 obtained their water from surface sources. Due to the nature of the turf industry, demand for water occurs between May and December, peaking in August and September.

Acreage projections in the Georgia Basin were closely tied to population projections. The underlying assumption was that expansion will correlate directly to population expansion in the region. Therefore, major population centers within 250 miles (feasible transportation threshold) of each planning area were identified as potential markets. Population projections, provided by McGraw-Hill for Metropolitan Statistical Areas (MSA's) in the study area, forecast an 85% population increase by 2050. This percentage was applied to the 1992 acreage establishing from the survey, assuming direct correlation. Table 1 and Figures 2 and 3 show the impact of projected population increases in the ACF/ACT region on nursery and turf water demand.

IRRIGATION TYPES

Solid set sprinklers with standard heads is the predominant irrigation system in field operations, used by 48% of the respondents (Table 2). Drip irrigation is the next most prevalent system, followed by portable pipe and hand watering. Likewise, the most common irrigation system with

container operations is solid set sprinklers with standard heads, followed by drip. Portable pipe and hand watering are the third most used systems, with 16% of the operations using each.

Hand watering is by far the most popular irrigation system of the greenhouse operations. Almost twice as many respondents (64% versus 34%) use it as the next system, solid set sprinklers. Drip irrigation is also common with greenhouse operation, used by 20%.

Table 1. Projected Water Demand, Georgia Basin

Year	Container	Green-house	Field	Turf	Total
			mgd		
1992	1.20	0.39	1.56	6.86	10.01
1995	1.27	0.43	1.64	7.21	10.55
2000	1.34	0.46	1.72	7.62	11.14
2010	1.50	0.50	1.95	8.58	12.53
2020	1.70	0.57	2.19	9.68	14.14
2050	2.23	0.74	2.88	12.72	18.57

Table 2. Four Most Prevalent Irrigation Systems by Nursery Operations [a]

Greenhouse		Field		Container	
Type	%	Type	%	Type	%
Hand watering	64	Solid set sprinkler std. head	48	Solid set sprinkler std. head	70
Solid set sprinkler std. head	34	Drip	33	Drip	17
Drip	20	Portable pipe, hand move	22	Portable pipe, hand move	16
Micro spray	10	Hand watering	18	Hand watering	16

[a]The percentages do not sum to one hundred since some operations use more than one irrigation system.

Table 3. Four Most Prevalent Turf Farm Irrigation Systems[a]

Type	Percent
Traveling gun with hose reel, pull or tow	47
Center pivot	42
Traveling gun with cable tow	32
Solid set sprinkler with large guns	16

[a]The percentages do not sum to one hundred since some operations use more than one irrigation system.

At the end of the survey, an open-ended question was asked regarding anticipated changes in the respondents' irrigation systems. Most nurseries (73%) do not anticipate making changes in their operations. Of those who do plan changes, a fifth intend to change the type of irrigation system. Other anticipated changes include computerizing the irrigation system (14%), expanding the system (10%), and making the system more efficient (8%) (some operations plan more than one change.)

Traveling gun with hose reel, hose pull, or hose tow is the most common irrigation system used by the turf respondents (Table 3). Center pivot and traveling gun with cable tow are the second and third most prevalent systems. Solid set sprinklers with large guns are also common. The majority, 65%, of turf farms do not plan changes to their operations. Of those who do, 50% plan to irrigate more acreage and 17% anticipate changing their irrigation system.

WATER CONSERVATION DATA

Along with answers from turf and nursery growers, data on water conservation alternatives and their potential use were identified based on expert opinion and the 1992 irrigation survey conducted by Tyson and Harrison (1993). The expert opinion was gained through phone conversations with growers and irrigation and crop experts throughout the state. The following expectations of water conservation were derived from the available alternative technologies and estimates from growers regarding probable use.

POTENTIAL FOR WATER CONSERVATION FOR GREENHOUSE NURSERIES

Over half of all greenhouse nurseries currently water by hand. Water savings of 10% (with a high estimate of 30%) for an individual greenhouse producer could be expected from the adoption of drip irrigation. Only 20% of current greenhouse nurseries use some form of drip. That percentage is expected

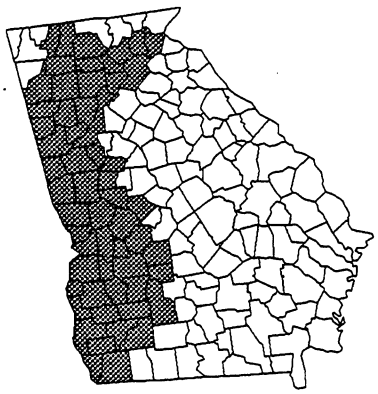

Figure 1. Georgia counties in the ACF/ACT river basins.

to remain constant because of previous adoption and the fact that some plants have specific needs that drip can not address.

Water savings of 20% for an individual farmer could be realized from the adoption of irrigation scheduling. Currently it is estimated that only 10% of greenhouse nurseries use some form of irrigation scheduling and that up to 85% of greenhouse nurseries could someday adopt its use. Using the available information, greenhouse nursery growers could be expected to save anywhere from 15% to 18% of current use.

POTENTIAL FOR WATER CONSERVATION FOR FIELD NURSERIES

Water savings of 10% (with a high estimate of 30%) could be expected for an individual farmer who converted to drip irrigation. At present 33% of existing field nurseries use drip irrigation systems and 75% of field nurseries are expected to adopt drip irrigation at some point in the future.

Field nurseries could also expect to save approximately 25% for an individual farm if it were to adopt some form of irrigation scheduling. Currently, only 10% of field nurseries are estimated to use irrigation scheduling, while 75% are expected to eventually adopt irrigation scheduling. Using the available information, field nurseries water savings estimates would range from 17% to 23%.

POTENTIAL FOR WATER CONSERVATION FOR CONTAINER NURSERIES

Current irrigation systems for container nurseries include sprinklers on small containers and drip irrigation on medium and large containers. An individual farmer may expect to save 10% (with a high estimate of between 30% to 50%) from the adoption of a drip irrigation system. Adoption of drip for small containers will likely not increase beyond its current level but adoption of drip for medium and large containers will most likely eventually increase from its current level to around 85%.

The adoption of irrigation scheduling could also save a potential 10% of water use. It is estimated that 20% of current container nurseries use some form of irrigation scheduling and that eventually 85% of container nurseries could be expected to use some form of irrigation scheduling. Using this and irrigation survey information, potential water savings were estimated to range from 7% to 14%.

POTENTIAL FOR WATER CONSERVATION FOR TURF

Turf growers presently use irrigation systems such as center pivot, traveling guns, and solid set sprinkler systems for their irrigation needs. Water savings of 10% could be expected from the adoption of some form of irrigation scheduling. This may be difficult for some farmers, given that there is currently no formal irrigation scheduling program. Water savings may also depend on whether a farmer wants to harvest one or two plantings of turf per year. It is currently estimated that 20% of all turf farmers currently use some type of irrigation scheduling and that only 50% could ever be expected to adopt irrigation scheduling.

An individual turf grower could be expected to save 10% in water usage by converting from traveling gun to center pivot irrigation systems. Center pivots give more control over water application and use less water, thereby creating less evaporation. It is estimated that 35% of turf growers have already switched and that 50% could be expected to change. Traveling guns, because of their versatility, may be the only option for turf farmers with small, irregular-shaped fields. Overall water savings per river basin region were estimated to be from 4% to 8%.

CONCLUSIONS

The main objective of this paper was to report the results of a water-use survey of existing nursery and turf farm operations within the Georgia study area (the Georgia Basin). Nursery and turf farms were identified using membership lists of the Georgia Green Industry Association and Georgia Turfgrass Association. Also used was the Georgia Department of Agriculture's Plant Protection Program list of all licensed nursery operations in the state. Those commercial nurseries and turf farms within the 59 counties in the Georgia Basin were the basis for the mail survey.

Secondly, through discussions with growers and irrigation experts, this report identified current water conservation techniques that can be applied at nurseries and turf farms based on the types of operation and current irrigation systems

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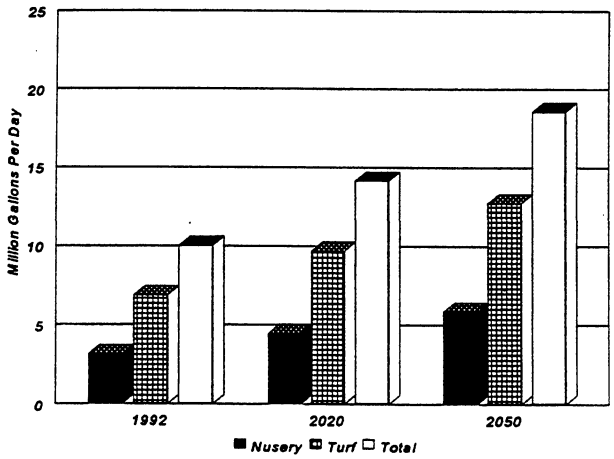

Figure 2. Projected water demand for irrigation - Georgia nurseries.

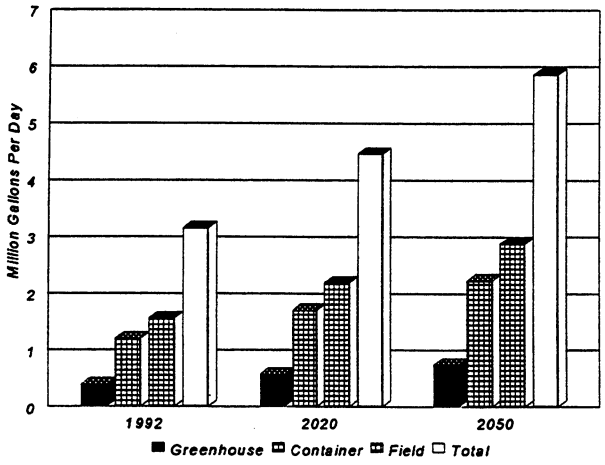

Figure 3. Projected water demand for irrigation - Georgia nurseries and turf.