

# **Final Report: Conservation Innovation Grant**

**Project Grant Number: 68-3A75-5-210**

**October 1, 2005 – September 26, 2009**



**“Demonstration of low cost drip irrigation systems  
for use in a limited resource farmer setting and  
transfer of alternative crop technology”**

## **Introduction:**

Prior to being exposed to this project, many small scale/limited resource farmers in the Arkansas (AR) delta irrigated their crops through a water hose from a residential outlet straight to the field or by using a sprinkler system commonly used for watering lawns. These methods usually caused excessive runoff and/or over irrigation leading to plant scalding. Through research and discussion with alternative crop producers this was proven not to be cost effective and does not meet the goals of NRCS in teaching the importance of minimizing water waste in communities across the nation.

During October 2005, the University of Arkansas at Pine Bluff (UAPB) Agriculture Demonstration Outreach Center (ADOC), in collaboration with the USDA Natural Resources Conservation Service (NRCS) and the East Arkansas Enterprise Community (EAEC) began a project on developing an innovative water management/conservation program. The program is designed to provide small scale and limited resource farmers with a low cost drip irrigation system tailored to meet the farmer/producers' individual needs. In the early stages of the project, the entities were dedicated to the pre-selection process to identify eligible farmers who could participate in the program. A "Farmers Application and Agreement for the Conservation Innovation Grant" form was developed to identify farmers in the East Arkansas Enterprise Community who were interested and could participate in the project.

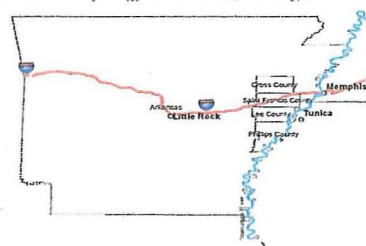
## **RECRUITMENT:**

An announcement was posted in two local newspapers to generate applications for the program (appendix 1)

Part of the requirement for being selected in this initiative was for the farmer to be NRCS-Environment Quality Incentive Program (EQIP) eligible. To determine their eligibility, the farmers were directed to go to the Small Scale Limited Resources Farmer Self Determination Tool at [http://www.lrftool.sc.egov.usda.gov/tool.asp?state\\_name](http://www.lrftool.sc.egov.usda.gov/tool.asp?state_name).

This procedure was initiated to better prepare and enable the farmer to be more aware of the opportunities that may be available under USDA programs. Many of the CIG participants who are EQIP eligible received assistance in putting down electric submersible wells or had an identified water source for irrigation purposes under the program. UAPB provided supplies and technical assistance to install the "low cost drip irrigation systems" which were used to irrigate approximately one acre plots that were set-aside for drip irrigation on alternative vegetable crops. Other vegetable crops were irrigated through normal means, such as furrow and flood methods.

The target area for the project is 40 miles west of Memphis, TN and 110 miles east of Little Rock, AR (the AR Delta) within a 30 mile radius of Interstate 40. The counties that the project area targeted were St. Francis, Cross, Crittenden, Lee, Phillips and Monroe.



During the farmer's identification, application and agreement process a selection committee was established to select the participating farmers. These participating farmers had to meet a pre-determined set of criteria for final selection. The selection committee reviewed each application pursuant to the selection criteria before the final selection was made. The selection committee consisted of UAPB staff and farmers who are knowledgeable in vegetable production and have an interest in water management and conservation.

During year 1, twenty-two (22) applications were reviewed for program participation. Fifteen (15) of these twenty-two met the eligibility requirements and were subsequently notified of their selection for the program. Seven farmers were in St. Francis County, 7 were in Lee County and 1 was in Cross County. Prior to selection, the farmers were provided with an application and agreement delineating the responsibilities of both UAPB and the individual farmers (appendix 2). All CIG participants had to sign an agreement stating that they will abide by all rules and regulations brought forth by UAPB and NRCS. The farmers were selected by criterion that was established by NRCS/UAPB. During the three year project, more than 20 small and limited resource farmers participated in the drip irrigation demonstration.

#### **Expectations for producer participation and requirements:**

- Provide a water source
- Provide UAPB & NRCS access to the CIG site
- Provide the necessary labor for project implementation
- Maintain and provide records for project documentation
- Promote and teach good irrigation practices to other alternative crop producers
- Promote and recruit new participants for UAPB and USDA-NRCS programs

By using the drip system, we showed the participants the importance of irrigation efficiencies to reduce energy cost. Through these efforts of providing information, education, technical assistance and materials for irrigation, participants were better able manage and operate their small scale farm.

The UAPB-ADOC staff worked with the identified farmers by providing technical assistance as well as proper design information, installation help and advice on the use of the "Drip Irrigation Systems".

The outcome from the use of this technology produced better quality and quantity of vegetables for alternative crop marketing and household consumption. In all cases the drip system improved water management efficiencies on small scale farm operations.



## Objectives and Accomplishments:

**Objective 1: Demonstrate the feasibility of using low cost, high technology irrigation to meet the needs of limited resource farmers through re-engineering of technologies used on larger scale operations.**

The primary goal of this project was to teach technology to small and limited resource farmers and to create innovative practices for conserving water. The drip irrigation practices introduced by the collaborating parties were essential in providing the CIG participants with information and tools to irrigate vegetable crops in Eastern Arkansas. It was noted that the crops of project participants flourished while other farmers were unable to irrigate efficiently during this same period of time. The most prevalent crops grown under drip irrigation were watermelons, cantaloupes, tomatoes, okra, corn, snap beans, cabbages and a host of different varieties of peppers and squash. However, some growers did grow crops such as Horticulture Beans, Sweet Potatoes and Irish Potatoes on an experimental basis to see how these vegetables performed when grown under drip irrigation conditions as compared to traditionally methods.



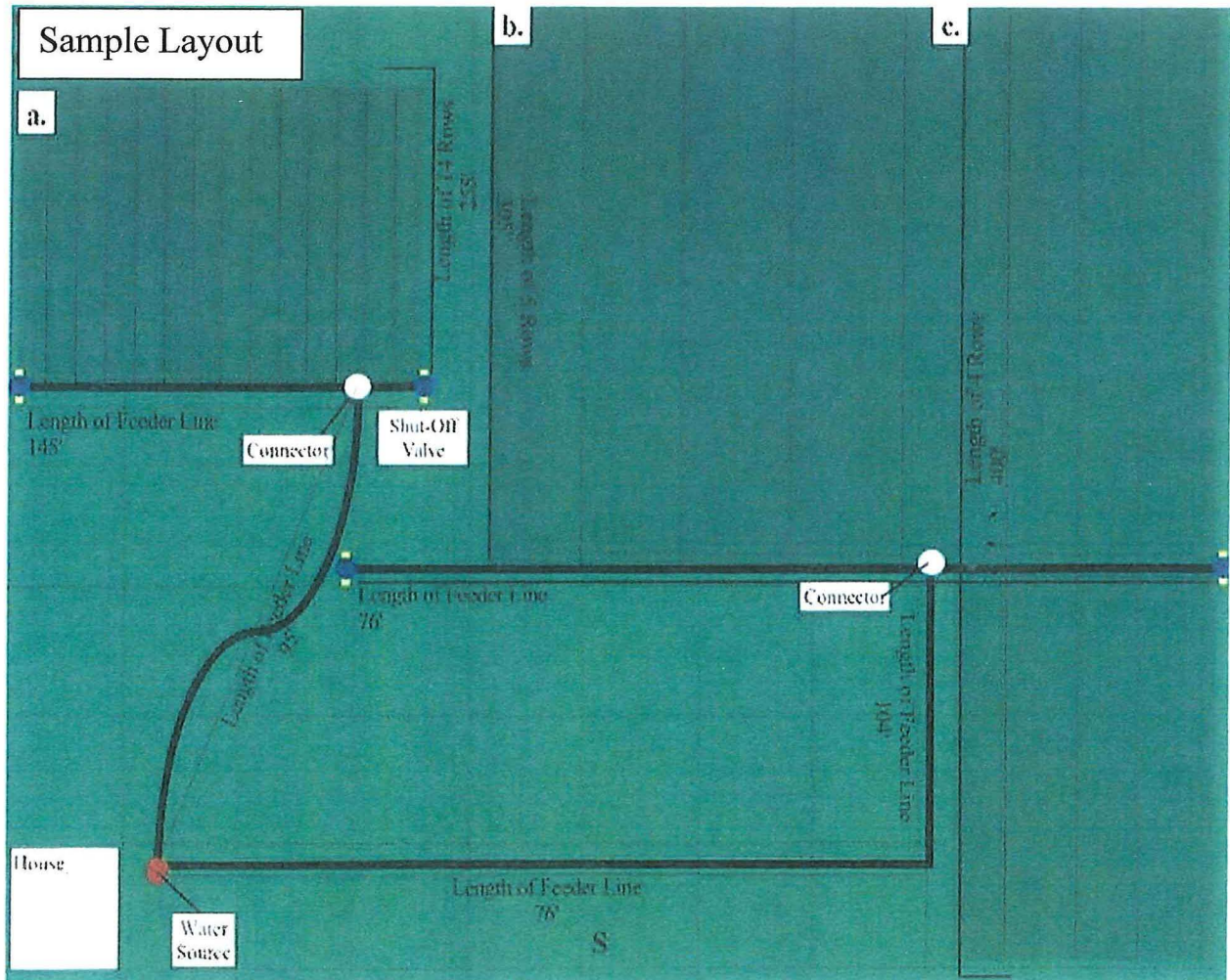
Additional time was required to actually develop individual drip irrigation systems plans for each farmer. Each farmer had specific needs that may or may not be uniform with the other participants. Therefore, a different irrigation system plan was necessary for each farmer/participant. UAPB provided supplies and technical assistance to install the “low cost drip irrigation system” on each farmer’s field. Each field was approximately 1.0 acre that was set-aside for drip irrigation of alternative vegetable crops. Other vegetable crops were irrigated through normal means, such as furrow and flood methods.

UAPB supplied all participants with the components needed for drip irrigation. Components such as pressure regulators, filters, drip irrigation feeder line, residential hose/feeder line adapter, feeder line splicer, feeder line/drip tape connectors, drip tape connectors, feeder line hole puncher, goof plugs, drip tape splicer, feeder line hole puncher, shut-off valves, tee connectors, flow meter, a roll of black plastic mulch and a roll of drip tape. Through workshops and onsite installation assistance, participants were informed about the importance using all components of the drip system. They were told that all components of the system could be used for a minimum of three years if properly maintained and stored with the exception the roll of plastic mulch and drip tape. Under the demonstration, UAPB provided the



overall technical assistance and the EAEC provided the mulching machine to install the tape and mulch while the farmer provided crop inputs, labor and land. UAPB and EAEC also maintain other specialized equipment that may be borrowed by project participants for installation of the drip irrigation system.

Twenty (20) farmers participated in the project during the three years that it was conducted. A layout of each farmer's field was made to fit the terrain and the particular circumstances faced by the farmer. The farmers name(s) are not included in this document. The information contained herein provides a sample layout and a general description of a drip system.



The sample drip system consists of 25 rows under drip irrigation running north to south with the feeder line located in the middle of the rows running east to west. Fourteen (14) rows were 286 feet; 6 rows were 326 feet; and 5 rows were 435 feet long. The farmers were provided a data sheet (appendix 3) and provided oral instructions on how to record their irrigation data. Also, it was explained to each person that UAPB/NRCS expects them to record water practices to the best of their ability. The farmer grew horticulture beans, watermelons, cantaloupe, and varieties of peppers, tomatoes, okra and squash under the drip system.

**Objective 2: Improve irrigation efficiencies and reduce energy cost for limited resource farmers while maintaining or increasing production.**

The project was able to reduce water usage for irrigation purposes and minimize water and electricity cost for project participants. While maintaining or forging a relationship between our targeted audience and entities that can supplement their small farm operation, UAPB and EAEC employees met with the area electric cooperative (Woodruff Electric) regarding partnering with the University and the CBO in an effort to assist



small scale/limited resource farmers with ways to install an economical source of power for submersible wells that are used to irrigate small vegetable plots on individual farm sites. The electric cooperative allowed these farmers to access their existing residential utility meter sources where it was feasible. This eliminated the extra costs of an additional electrical pole and a separate fee for providing power to the submersible well. This also allowed for off peak irrigation rates, which is another cost saving tool. The CIG participants who received submersible wells stated there was no significant difference in the cost of utilities (CIG participants used electricity sources that ran concurrently with the household meter). On an average, each CIG participants estimated that their household electricity bill increased by 10 to 15% (twenty to thirty-five dollars) during peak months of irrigation.

**Objective 3: Inform and educate small scale/limited resource farmers and policymakers about how irrigation technologies can be utilized by small scale irrigators to play a role in solving critical ground water decline problems and improve irrigation efficiencies.**

Over the project duration, personnel from the state and local NRCS offices, the NRCS-National Water Management Center (NWMC) and other USDA agencies have played an integral part in the success of meetings. By using the project, UAPB was able to teach the importance of water conservation. This is important because in the AR Delta; row crop farmers use very large amounts of water to irrigate large acres of rice, soybean, corn, and cotton. This has caused the groundwater table to fall tremendously in some areas. In fact, the Mississippi River Valley Alluvial Aquifer (the primary irrigation source) has declined at the rate of about 1 foot per year for a number of years. The decline has led to a declaration of a critical ground water use area by the Arkansas Natural Resources Commission (ANRC) in each of the counties where the project is located.

Some of the ways that UAPB has used the CIG project to educate small scale/limited resource farmers and policy makers on the importance of drip irrigation include:


- On February 17, 2007, UAPB in collaboration with the EAEC sponsored a CIG meeting to inform alternative crop producers about this season's initiative. Eighteen alternative crop producers were present at this meeting.
- During the spring of 2007 a workshop was facilitated by UAPB personnel on water conservation and good irrigation practices at the annual Rural Life Conference (400 participants) held at UAPB.
- The University of Arkansas Pine Bluff's Conservation Innovation Grant was chosen to give an oral presentation of the work that is being done in the AR Delta on groundwater conservation. The presentation focused on using/promoting drip irrigation by small scale/limited resource farmers during the 2007 Soil and Water Conservation Society Annual Conference at Saddle Brook Resort, near Tampa Bay, Florida.
- On July 31, 2008 a youth field day was held at the UAPB Agriculture Demonstration and Outreach Center (ADOC) to educate youth on the importance using good irrigation practices and the benefits of supplying locally grown vegetables.
- On August 16, 2008 near the end of the growing season, a meeting was conducted to receive comments and feedback from the CIG participants. The farmers expressed enthusiasm about using the drip system and said it was definitely beneficial to them. They said: 1) crop yields increased 60 to 75% percent while water usage decreased by 75% on the average; 2) it was really convenient to be able to irrigate alternative crops at their own discretion, while not having to waste water; 3) many local youth were used to plant, upkeep and harvest fruit and vegetables during the summer, this kept the youth busy (summer employment) while also teaching good work ethics and the importance of agriculture; 4) the CIG project was used to supplement household income, decrease grocery cost and provide a fresh source of food for nutrition.
- A web based workshop "Irrigation Systems for Small Farms" was presented to the East National Technology Support Center on September 24, 2008 by Leslie Glover and Alexis Cole. The NRCS National Water Management Center served as the host site for the presentation.
- On December 19, 2008, a power point presentation illustrating the use of drip irrigation in Eastern Arkansas was made during the East Arkansas Enterprise Community, Inc.'s (EAEC) Annual Public Meeting by the project director and technician. The presentation



emphasized the collaboration between UAPB and NRCS in promoting good irrigation practices along with other USDA programs that can be used by the targeted audience.

- A CIG workshop was held for twenty farmers on March 20, 2009 at ADOC. This was a “hands-on” workshop in recordkeeping, completion of forms relevant to the CIG program, pesticides applications and herbicide applications.

### **Outcomes:**

- Prior to the fall of 2005, many of the Small Scale/Limited Resource Farmers that marketed vegetables through the ADOC facility did not have a reliable source of irrigation water for their crops. These farmers were given the opportunity to get submersible wells through the Natural Resources Conservation Service (NRCS) Environmental Quality Incentive Program (EQIP) as a result of this project. By getting a well for irrigation from the USDA program, limited resource farmers increased crop yields, increased their property value, and helped federal/state employees identify eligible farmers in an underserved community who qualified for other USDA programs. By qualifying for EQIP, farmers will have better access to USDA programs, such as the Conservation Innovation Grant (CIG) program.
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- Through the Conservation Innovation Grant program, UAPB in collaboration with the East Arkansas Enterprise Community was able to select Small Scale/Limited Resource Farmers who were eligible for assistance in the NRCS/Environmental Quality Incentive Program. These efforts were a vital way of introducing and mending a relationship between USDA programs and socially disadvantage farmers and ranchers in the project area.
  - UAPB and EAEC employees met with the area Electric Cooperative (Woodruff Electric) regarding partnering with UAPB/EAEC in an effort to assist the Small Scale/Limited Resource Farmer with ways that these producers can install an economical source of power to irrigate small vegetable plots on their individual farm sites. The Woodruff Electric allowed these farmers/producers to access their existing utility meter sources where feasible. This eliminated the extra costs of an additional electrical pole and a separate fee for their wells. This also allowed for usage of electricity during off peak hours thus reducing irrigation rates, which is another cost saving feature.
  - The project helped the university secure a companion grant from the NRCS National Water Management Center to demonstrate drip irrigation techniques at the UAPB Agriculture Demonstration Outreach Center (ADOC) in Marianna, AR. Attempts were made to operate the system at ADOC by using an eight inch ( 8”) submersible irrigation



well that had been retrofitted prior to UAPB obtaining the property. The 8” well was reduced to provide a 2” discharge directly to the 1.3 acre plot or to go to a storage tank (1000 gallon capacity) that is located in the ADOC facility. The field plumbing had to be repaired each year due to high pressure bursting pipes. Plans are underway to change the water supply to the drip system and find a permanent solution to the water supply problems. During the duration of the CIG project only one alternative crop producer used this method of drip irrigation on its prospective farm site. The farmer experienced the same problems as UAPB. The following year, the farmer was selected to receive a well from EQIP for alternative crop production. All other CIG participants used residential water sources prior to receiving a well or sign-up for CIG after qualifying and receiving wells for alternative crop production.

- During the project, eight (8) workshops were held with small scale and limited resource farmers. As a result, NRCS and UAPB personnel were able to see a need to recommend a change in the existing regulations on the proper installation of small submergible wells being used to operate drip irrigation systems. The existing regulations did not include a storage tank nor did they include a pump house to protect the storage tank and wellhead. The storage tank and the pump house were added to the existing regulations as allowable costs under EQIP. These changes greatly assisted these targeted farmers with drip irrigation practices.



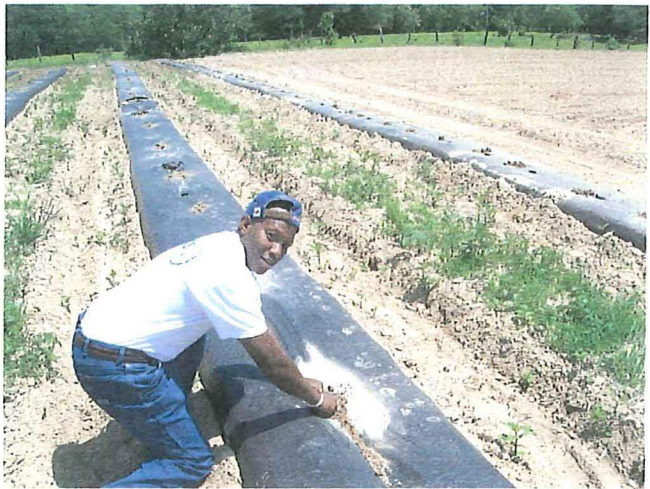
- Through the collaboration of UAPB and NRCS, drip irrigation has become a practice more widely accepted across eastern Arkansas. Some alternative crop producers said “the best thing about drip irrigation is we can make it rain when we want too”.
- Many homeowners have developed an interest in the CIG project but did not have access to adequate land to participate in the project (homeowners wanted to use drip irrigation for home garden purposes). In eastern Arkansas (St. Francis, Lee, Cross and Phillips Counties), it was found that residents in rural small cities and towns have small tracts of land to grow fresh vegetables. Many of the community leaders have used this initiative to help the low income and elderly in the area work in collaboration with city and state officials as well as local nonprofits (East Arkansas Enterprise Community, Inc.) to teach the importance of conserving water, eating healthy and supplementing income through alternative crop production.

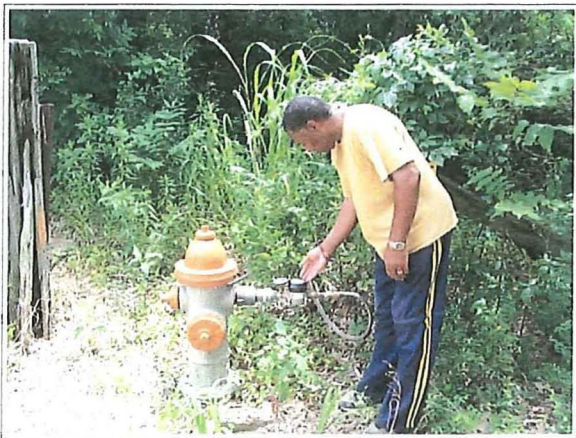
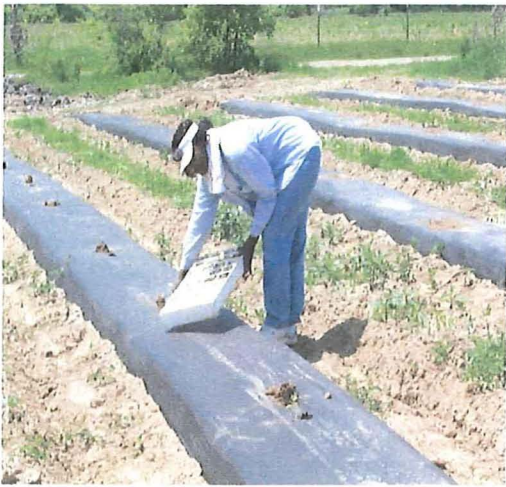
- Through the CIG joint initiative with EAEC, another partner joined UAPB. The Enterprise Corporation of the Delta (ECD) a non-profit community development corporation in Jackson, Mississippi provided resources to purchase a mulching machine which was a needed asset for the project.
- Using drip irrigation was successful in not only teaching good irrigation practices, it was also used as a tool for UAPB staff to advise project participants about the importance of farm maintenance procedures, record keeping and other characteristics of running a farm/business operation.
- Each of the farmers in the program indicated that without the UAPB-NRCS-CIG project they would not be financially capable of competing in the vegetable production and marketing business with any long term sustainability.

### **Lessons Learned:**

- Electricity use in Kilo-Watts could not be measured because most CIG participants used electricity sources that ran concurrently with the household meters. On average each CIG participant household electricity bill increased by ten to fifteen percent (twenty to thirty-five dollars) during peak months of irrigation.
- Energy audits are a valuable asset in evaluating production costs. A need exists to develop an electrical usage form on crop production that would be separate from residential utilities. Water usage can be verified by using flow meters, however, electrical usage is a more complex problem when dealing with residential water sources.

# Selected photos taken during the project.





## Appendix 1

## ANNOUNCEMENT

## DRIP IRRIGATION SYSTEM DEMONSTRATION PROJECT

The University of Arkansas at Pine Bluff (UAPB) will assist approximately 20 Limited Resource Farmers in obtaining a low cost re-engineered drip irrigation system through a Conservation Innovation Grant (CIG) in Cross, Lee, Monroe, Phillips and St. Francis Counties. Completed applications must be:

Received by January 30, 2006

Send to:

Mr. Ernest Bradley, Multi-County Horticulture Agent  
15 East Chestnut, Suite 7B  
Marianna, AR 72360

For more information, please contact Mr. Ernest Bradley at 870-295-7720.

The Drip Irrigation System Demonstration Project is open to all interested persons without regard to race, color, national origin, religion, gender, age, disability, marital or veteran status, or any other legally protected status.

# FARMERS APPLICATION AND AGREEMENT CONSERVATION INNOVATION GRANT SMALL FARM DRIP IRRIGATION (CIG) PROGRAM

Date: \_\_\_\_\_

### General Information

Applicant's Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone: \_\_\_\_\_ Cell: \_\_\_\_\_

Total Acres Owned: \_\_\_\_\_ Total Acres Leased for Farming \_\_\_\_\_

Total Acres committed to vegetable production: \_\_\_\_\_ Total Acres Irrigated \_\_\_\_\_

Farm Location(s) County \_\_\_\_\_ Farm # \_\_\_\_\_ (Attach copy of Farm Map)

### CRITERIA FOR DRIP IRRIGATION PROGRAM ELIGIBILITY

- 1. Are you a small scale/limited resource farmer? Yes \_\_\_\_\_ No \_\_\_\_\_
- 2. Do you live in Cross, Lee, Monroe, Phillips or St. Francis County? Yes \_\_\_\_\_ No \_\_\_\_\_
- 3. Are you or will you be eligible for any NRCS/EQUIP programs? Yes \_\_\_\_\_ No \_\_\_\_\_
- 4. I agree to attend workshops that pertain to this project? Yes \_\_\_\_\_ No \_\_\_\_\_
- 5. I agree to allow farm tours of this project site if selected. Yes \_\_\_\_\_ No \_\_\_\_\_
- 6. I agree to adhere to all program rules and regulations. Yes \_\_\_\_\_ No \_\_\_\_\_

\_\_\_\_\_  
*Applicant Signature*

Date: \_\_\_\_\_

*Return Address: Mr. Ernest D. Bradley, Sr. – Multi County Agent – Horticulture  
15 East Chestnut  
Room 7B  
Marianna, Arkansas 72360  
Office (870)295-7720 Fax: (870)295-7721*

*Additional Information may be required*



