NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

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NATIONAL REGISTER OF HISTORIC PLACES REGISTRATION FORM

1. Name of Property

historic name Cullars Rotation

other names/site number Alvis Field

2. Location

street & number Woodfield Drive, approx. 200 feet east of US Hwy 29 not for publication N/A
city or town Auburn vicinity N/A
state Alabama code AL county Lee code 081 zip code 36830

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this X nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property X meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant ___ nationally X statewide ___locally. (___ See continuation sheet for additional comments.)

Signature of certifying official — March 4, 2003 Date

Alabama Historical Commission (State Historic Preservation Office)
State or Federal agency and bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria.
(___ See continuation sheet for additional comments.)

Signature of commenting or other official — Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that this property is:
[✓] entered in the National Register
[ ] See continuation sheet.
[ ] determined eligible for the National Register
[ ]See continuation sheet.
[ ] determined not eligible for the National Register
[ ] removed from the National Register
[ ] other (explain): _____

Signature of the Keeper — Date of Action

Edson H. Beall — 4-18-03

Signature of the Keeper — Date of Action

5. Classification

Ownership of Property (Check as many boxes as apply.)

[ ] private
[ ] public-local
[X] public-state
[ ] public-Federal

Category of Property (Check only one box.)

[ ] building(s)
[ ] district
[X] site
[ ] structure
[ ] object

Number of Resources within Property (Do not include previously listed resources in the count.)

Contributing	Noncontributing	
0	0	buildings
1	0	sites
0	0	structures
0	0	objects
1	0	Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions (Enter categories from instructions)

Cat: Agriculture — Sub: agricultural field
Education — research facility

Current Functions (Enter categories from instructions)

Cat: Agriculture — Sub: agricultural field
Education — research facility

7. Description

Architectural Classification (Enter categories from instructions)

N/A

Materials (Enter categories from instructions)

foundation N/A
roof N/A
walls N/A
other N/A

Narrative Description (Describe the historic and current condition on continuation sheet/s.)

8. Statement of Significance

Applicable National Register Criteria (Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

X A Property is associated with events that have made a significant contribution to the broad patterns of our history.
____ B Property is associated with the lives of persons significant in our past.
____ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
____ D Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations (Mark "X" in all the boxes that apply.) N/A

____ A owned by a religious institution or used for religious purposes.
____ B removed from its original location.
____ C a birthplace or a grave.
____ D a cemetery.
____ E a reconstructed building, object, or structure.
____ F a commemorative property.
____ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance (Enter categories from instructions)

Agriculture
Education
Science

Period of Significance 1911-1952

Significant Dates c.1911 c.1914

Significant Person (Complete if Criterion B is marked above) N/A

Cultural Affiliation N/A

Architect/Builder N/A

Narrative Statement of Significance (Explain significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS) N/A

____preliminary determination of individual listing (36 CFR 67) has been requested.
____previously listed in the National Register
____ previously determined eligible by the National Register
____designated a National Historic Landmark
____ recorded by Historic American Buildings Survey # _____
____recorded by Historic American Engineering Record # _____

Primary location of additional data:

[ ] State Historic Preservation Office
[ ] Other state agency
[ ] Federal agency
[ ] Local government
[X] University
[ ] Other
Name of repository:
Auburn University Library

10. Geographical Data

Acreage of Property 3.9 acres

UTM References (Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	16	642310	3606500	3			
2				4			

___ See continuation sheet.

Verbal Boundary Description (Describe the boundaries of the property on a continuation sheet.)

Boundary Justification (Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Charles C. Mitchell, Jr., Extension Agronomist-Soils & Professor and Christy Anderson, National Register Coord.

organization Dept. of Agronomy & Soils, Auburn Univ./Alabama Historical Commission date March 29,2002

street & number 201 Funchess Hall/468 S. Perry St. telephone (334)844-5489/(334)230-2658

city or town Auburn University /Montgomery state Alabama zip code 36849-5412/36130-0900

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.
A **sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items (Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of the SHPO or FPO.)

name Auburn University, President William Walker

street & number Office of the President, 107 Samford Hall telephone 334-844-4650

city or town Auburn University state Alabama zip code 36849

Cullars Rotation occupies an area measuring 408.5' x 417', approximately 3.9 acres. The rotation is made up of three tiers(blocks) with 14 plots in each. Each plot measures 20' x 99', with 2 feet between each plot and 20 feet between the tiers. The cropping area is marked by concrete pillars in the ground (328.5' x 337'). A 40-foot buffer to nearby parking lots and other development on each side is assured. Today, the experiment is a three-year rotation of (1) cotton followed by winter legumes, (2) corn harvested for grain and followed by winter wheat or another small grain, and (3) soybean double cropped after the small grain is harvested.

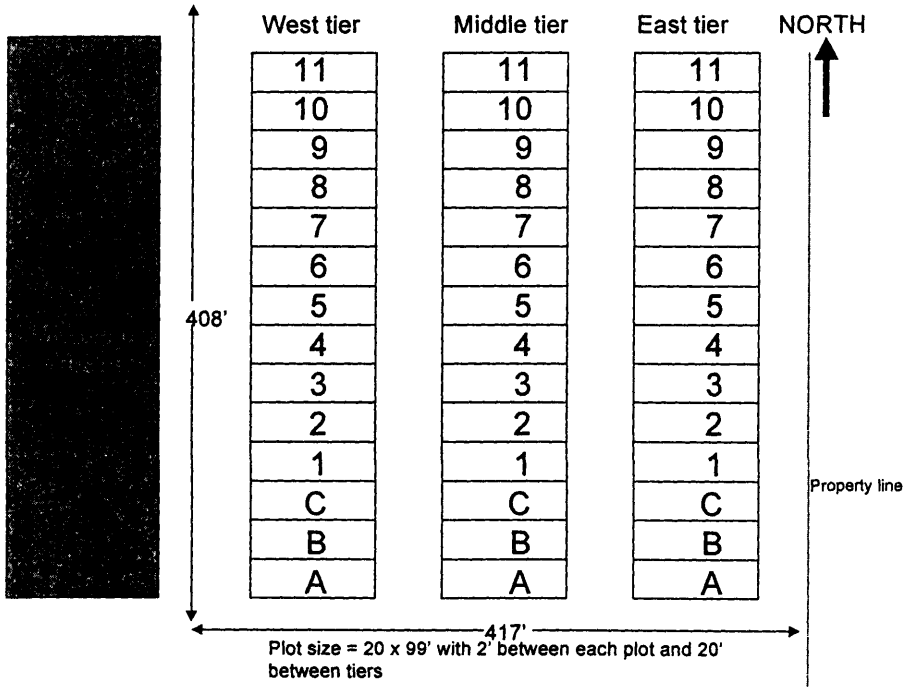

Figure 1. Schematic of Cullars Rotation (not drawn to scale).

It is located on a Marvyn loamy sand (fine-loamy, siliceous, thermic Typic Kanhapludults) adjacent to the Auburn University campus (at one time, the soil was called a Norfolk loamy sand).

Original design was 11 soil treatments replicated 3 times, one replicate for each of the 3 crops in the 3-yr rotation , in an ordered block design (Fig. 1). In 1914, an additional 3 treatments (designated A, B, and C) were added to study the effect of winter legumes in the rotation. Plot size is 20 x 99 feet with a 2-foot border between each plot and 20 feet between each tier (block). The cropping area of each tier is marked by concrete pillars in the ground (328.5' x 337'). A 40-foot buffer to nearby parking lots and other development on each side is assured. Therefore, the entire Cullars Rotation occupies 408.5' x 417' (3.9± acres)

Archaeological component. Although no formal archaeological survey has been conducted on this plot, the potential for subsurface remains is low. The continuous use of this field for agricultural crops for over one hundred years leaves little potential of located undisturbed remains.

Statement of Significance

Cullars Rotation is significant under Criterion A for its contributions to agriculture, education, and science. Cullars Rotation has made important contributions to agricultural science through its continuous study of soil fertility on the same plot since 1911. The plot also served as an educational tool for students at Alabama Polytechnic Institute, later Auburn University, as well as for researchers and students from throughout the United States. The Cullars Rotation experiment (a cotton-corn-soybean rotation on 42 research plots) is the: oldest, continuous soil fertility study in the South; the second oldest cotton experiment in the world, with nearby Old Rotation (c. 1896; NRHP 1988) being the oldest; and one of the oldest, continuous field research plots in North America (Mitchell, et al, 1991). The Cullars Rotation on the Alvis Field is the site where Professor Atkinson conducted most of his early work with cotton rust. Today, this is the only site in the South where students can study plant nutrient deficiencies (especially potassium deficiencies) on five different crops during the course of a year. It is visited each year by dozens of agricultural scientists who come to Auburn from all over the world. Because of the documented history on each of the 42 plots, soils from these plots are used for biological, chemical, and physical studies and are shared with scientists all over the world. Data from this experiment have been the source of numerous scientific, popular, and educational publications on cotton production and soil fertility throughout the plot's use, such as Alabama Polytechnic Institute's Extension Service publication of *A Handbook of Alabama Agriculture*, which, in addition to addressing other aspects of farming, provided detailed information by crop and soil type how best to maintain soil fertility. Unlike many field experiments which are conducted for two to three years and terminated, the Cullars Rotation has continued to provide valuable information on soil fertility and crop production to generations of farmers, scientists, and students.

The Cullars Rotation was designed primarily to study the long-term effect of potassium fertilization on a 3-year rotation which included cotton, corn, small grain and summer legumes (cowpeas or soybean). Yield records since 1911 have been maintained by researchers in the Department of Agronomy and Soils. Names of professors and researchers that have been associated with the Cullars Rotation include J.F.Duggar, E.F. Cauthen, J.T. Williamson, M.J. Funchess, D.G. Sturkie, E.M. Evans, L.E. Ensminger, J.T. Touchton, and C.C. Mitchell.

Historical Narrative

In the late 1800s, most of Alabama was planted to cotton. Mr. John P. Alvis and his brother-in-law, Mr. J.A. Cullars, owned and farmed the land now occupied by Cullars Rotation and the new art museum currently under construction. Like everyone else, cotton was their cash crop. But the sandy soils on this site presented a problem - a problem very common to all cotton on sandy soils of the Coastal Plain region of the Carolinas, Georgia, and Alabama. In late July and early August, the leaves would become blighted, turn rusty brown and fall off, severely reducing the yield. This disease which plagued cotton throughout the South was called "cotton rust" or "cotton blight".

Professor George F. Atkinson, a biologist at the Agricultural and Mechanical College of Alabama at Auburn, devoted years to studying bacteria and fungi which were found on the rust-infested cotton. Some of his samples came from the nearby field of Mr. Alvis and Mr. Cullars. In the late 1880s he established some on-farm research plots where he applied various soil amendments including kainite, a potassium-bearing mineral. Although not specifically stated in his publications, some of these plots must have been on the field of Mr. Alvis and Mr. Cullars because soils on this site are the most "porous" and rust-prone cotton soils in the area. In one on-farm test, Professor Atkinson noted that ". . . the whole field blighted in August and September (1886) with the exception of the three rows where the kainite was applied." He quoted another farmer as saying, "Kainite causes the cotton plant to retain its leaves after they have blighted where none is used." As a result of these on-farm tests and collaboration with other researchers in South Carolina, Georgia, and Mississippi, Professor Atkinson concluded that potassium fertilization could reduce or eliminate the rust and blight problems. Atkinson's research led to widespread use of potassium (or potash) fertilizers that are so important to today's successful crop production on all soils in the southern United States.

While his research predates the official establishment of Cullars Rotation, it is probable that Professor Atkinson's cotton rust research was conducted on this field. The site of the Cullars Rotation is the deepest, sandiest Coastal Plain soil in close proximity to the old main research farm at the Agricultural and Mechanical College of Alabama (which became Alabama Polytechnic Institute in 1899 and Auburn University in 1960). Potassium deficiencies are most prominent in deep, sandy Coastal Plain soils. Professor Atkinson, out of necessity, did most of his research on farmer's fields because the Agricultural Experiment Station did not own much field research property at that time. The fact that Cullars Rotation included 5 rates, or concentrations, of potassium fertilization throughout its usage suggests that the researcher(s) who started this experiment realized that crops on this site had potassium deficiency problems.

Acknowledgment of the work being done in Southern experiment stations and by Professor Atkinson preceded the formal establishment of Cullars Rotation. F.S. Earle wrote in 1908 that "Thanks largely to the persistent efforts of the Southern experiment stations, the possibilities of mixed husbandry and of better agricultural methods are becoming somewhat widely appreciated, and the next few decades will doubtless witness a complete revolution in the farming methods of the South" (p. 172-173). He went on to note that cotton diseases were first seriously studied "by Professor G.F. Atkinson, while connected with the Alabama Experiment Station" (p. 183).

Through federal legislation, Alabama received funds earmarked first for diffusing agricultural knowledge and later for conducting original research. For many states, including Alabama, this legislation helped create agricultural experiment stations to meet these goals. The station connected with Alabama Polytechnic Institute was the first established in the state. With the passage of the Adams Act in 1906, USDA officials sought to limit the expenditure of federal funds for the diffusion of knowledge through publications and extension services. In1911, emergency legislation in Alabama was enacted to provide experiment stations with funds to combat the boll weevil. The act's provisions included research and farm demonstrations. This was the first time since 1883 state money directly went to the experiment stations (Kerr:36): "In 1911, the Alabama Legislature appropriated to the Alabama Experiment Station a sum of money to conduct local experiments with field crops, fruits, fertilizers, livestock, etc., in the several sections of the State"(Williamson and Funchess, 1923). This "Local Experiment Law" provided a total of $27,000 in state funds to experiment stations, $7,000 of which was earmarked for local fertilizer experiments and the introduction of new and improved crops (Kerr: 36).

Mr. Alvis and Mr. Cullars continued to allow Alabama Polytechnic Institute use of their field for on-going research with crop fertilization. By 1911, a very large experiment was set up on what was then called the "Alvis Field". It involved many different soil amendments but rates of potash fertilization was its primary focus. This new experiment was named the "Cullars Rotation" in honor of the other farmer/landowner. Mr. John P. Alvis and his brother-in-law, Mr. J.A. Cullars, owned and farmed this property in the late 1800s. Mr. Cullars allowed Professor George F. Atkinson and others to conduct numerous early cotton fertility experiments on this property which led to the discovery that "cotton rust" was caused by a deficiency of potassium (Atkinson, 1891, 1892).

The original design of Cullars Rotation was 11 soil treatments replicated 3 times, one replicated for each of the 3 crops in the 3-year rotation, in an ordered block design. In 1914, an additional 3 treatments (designated A, B, and C) were added to study the effect of winter legumes in the rotation. Each of the 14 plots measure 20 x 99 feet with a 2-foot border between each plot and 20 feet between each tier (block). The cropping area is marked by concrete pillars in the ground (328.5' x 337'). A 40-foot buffer to nearby parking lots and other development on each side is assured. Therefore, the entire Cullars Rotation occupies 408.5' x 417' (3.9± acres).

The Alabama Agricultural Experiment Station staff helped shape the role and direction of experiment stations in a regional context. During a 1923 meeting, experiment station directors discussed a regional approach to agricultural research in detail. Director Dan T. Grey of the Alabama Agricultural Experiment Station outlined the merits of a regional approach, citing that it would allow the scope of study to be enlarged; it "would develop a spirit of greater confidence in us and in our work from the standpoint of the public"; states would not need to work independently on regional problems; individuals would be able to maintain perspective on the final application of projects; and finally that a regional approach would lend permanency and stability to experimental studies (Knoblach, 1962:192). Clearly experiment station scientists not only saw themselves as developing better agricultural methods, but also making sure the knowledge gained from their successes and failures was put to use on the farm.

Alabama Agricultural Experiment Station Bulletin 219 (Williamson and Funchess, 1923) summarized 226 experiments on farmer's fields throughout Alabama. An extensive cotton, corn, and legume fertility test begun in 1911 on the Auburn farm of Mr. Cullars and Mr. Alvis is the only one of these experiments that has been continued. Unlike the nearby "Old Rotation" experiment which was begun by Professor J.F. Duggar, records do not credit any single researcher with designing the Cullars Rotation experiment.

Auburn pioneered in a number of fields without federal prompting. The experiment stations began to looking into rural electrification, forestry, fisheries and crop diversification to deal with a statewide farm crisis even prior to 1929 crash (Kerr, 1985: 50). By 1930, there were 10 experimental fields in operation. Six of these were deeded directly to the institute and comprised of 33-60 acres each, and four had been rented prior to 1927. Data from this experiment have been the source of numerous scientific, popular, and educational publications on cotton production and soil fertility throughout the plot's use. In 1939, Alabama Polytechnic Institute's Extension Service began publication of *A Handbook of Alabama Agriculture*, which, in addition to addressing other aspects of farming, provided detailed information by crop and soil type how best to maintain soil fertility on different soil types throughout the state. The soil fertility experiments conducted on Cullars Rotation provided valuable scientific data that could be applied to farms with similar soil types in Alabama.

The fields, administered by the station's Department of Agronomy and Soil until the mid 1960s, were used originally to study fertility problems and crop adaptations in their soil areas (Kerr, 1985:57). Today, the experiment is a three-year rotation of (1) cotton followed by winter legumes, (2) corn harvested for grain and followed by winter wheat or another small grain, and (3) soybean double cropped after the small grain is harvested. In recent years, the test has been maintained as a (1) field laboratory for students and visitors studying crop nutrient deficiencies, (2) source of soil and plant material for greenhouse and laboratory research, and (3) site for continuous soil test calibration and sustainable crop production research.

Until 1997, all crops were conventionally tilled with moldboard plowing, disking, and regular cultivation. In the early years of the Cullars Rotation, sources of plant nutrients were blood meal for nitrogen, superphosphate (0-18-0) and rock phosphate, and kainit (0-0-12).

Since 1997 and the introduction of Roundup Ready ® cultivars, all crops are grown with minimum tillage. Cotton and corn are planted directly in the previous crop residue in narrow rows (20 to 30 inch rows) after paratilling (subsoiling) using a no-till planter. Soybeans are drilled into wheat residue in June using a no-till drill. In 1999, a Liberty-Link® corn hybrid was used (Pioneer 34A55 LL) which allowed direct planting into crimson clover residue. A stacked gene cotton (Paymaster 1220BG/RR) allowed cotton to be produced with only two applications of Roundup® herbicide. Since 1996, no insecticides have been applied for insect control. This has been possible because of the boll weevil eradication program in East Alabama and the advent of Bollgard® technology. All crops are machine harvested although occasional yield estimates are made by hand harvesting portions of each plot.

In recent decades, phophorus as concentrated superphosphate (0-45-0) or rock phosphate, potassium as muriate of potash (0-0-60), sulfur as gypsum, and a micronutrient mix containing B, Zn, Mn, Cu, and Fe are applied to appropriate plots in split applications in the spring prior to planting cotton and in the fall just prior to planting small grain. Nitrogen as ammonium nitrate (34-0-0) is applied to appropriate plots just prior to planting cotton and corn and as a sidedress application to these crops. The small grain is top dressed with 60 pounds N per acre in late February.

In addition to actual data produced, data from tests from Cullars Rotation lead to the establishment of the Auburn University Soil Testing Laboratory and other similar laboratories at other land grant universities in the South. Fertilizer recommendations are continually updated and improved based upon data from the Cullars Rotation and other shorter-term studies around Alabama and the South.

The field's continuous use in fertility experimentation has resulted in 90 years of data collection for cotton, corn, and soybeans on the same plot of land. Most research institutions find it difficult to continue field research plots for more than 10 years and abandon the fields. Increasingly, soil with a known history or well documented chemical properties is needed for unrelated laboratory or greenhouse research projects. Finding sustainable methods, determining long range effects of environmental and chemical additives on fertility and crop production are much easier issues to address if there are sites with treatment variables and a documented, long-term history of causes and effects.

References

Alabama Polytechnic Institute Extension Service. 1939 *A Handbook of Alabama Agriculture*. Auburn University Special Collections.

Atkinson, G.F. 1891. "Black rust of cotton." *Agricultural Experiment Station Bulletin,* No. 27. Auburn, AL: Agricultural and Mechanical College of Alabama.

–1892. "Some leaf blights of cotton." *Agricultural Experiment Station Bulletin,* No. 36. Auburn, AL: Agricultural and Mechanical College of Alabama.

Earle, F.S. 1908. *Southern Agriculture*. New York: The MacMillian Co.

Kerr, Norwood. 1985. *A history of the Alabama Agricultural Experiment Station, 1883-1983.*

Knoblach, H.C. 1962. *State Agricultural Experiment Stations: a history of research policy and procedures*. Washington, D.C: U.S. Dept. of Agriculture.

Mitchell, C.C., R.L. Westerman, J.R. Brown, and T.R. Peck. "Overview of Long-Term Agronomic Research." *Agronomy Journal*. Vol 83, No. 1:24-29.

Mitchell, C.C. 1999. "Cullars Rotation"

–1992. "Long-term Soil Fertility Studies–what they tell us." *Proceedings of the 1992 Southern Soil Fertility Conference, Memphis, TN, October 13-14, 1992.* Adrmore, OK: The Samuel Roberts Noble Foundation, Inc. p. 2-10.

Williamson, J.T., and M.J. Funchess. 1923. "Fertilizer Experiments with Cotton." *Agricultural Experiment Station Bulletin,* No. 219. Auburn, AL: Agricultural andMechanical College of Alabama.

Boundary Description
The nominated site is a rectangular parcel measuring 408.5 feet by 417 feet on the south side of Woodfield Drive on the Auburn University campus. See enclosed site plan 1.5" = 80 feet.

Boundary Justification
The boundaries for Cullars Rotation include the historic experimental plots and a 40-foot buffer that allows vehicular access to the field. Originally situated within a 25 acre field, construction of the Jule Collins Smith Museum of Art occupies most of the original Alvis Field. Cullars Rotation remains intact and continues to be used for on-going research and demonstration on sustainable crop production on soils of the southern United States.

Photographs
Photographer: Christy Anderson
Date of photographs: August 3, 2001; February 5, 2002
Location of original negative: Alabama Historical Commission
468 S. Perry Street
Montgomery, AL 36130

1. View from SW corner of West Tier, summer
2. View of unfertilized plots, looking east from West Tier, summer
3. Plot division, looking east from West Tier, summer
4. Plot division, looking east from West Tier, summer
5. View from NE corner of East Tier, summer
6. View from NE corner of East Tier, summer
7. View from NE corner of East Tier, winter
8. Detail of winter vetch planted in plots, winter