

PROJECT TERMINATION REPORT

NORTH CAROLINA

INSTRUCTIONS: For Federal-grant projects, send 3 copies to State Experiment Stations Division, ARS, at time of closing.

PROJECT NUMBER

FUND

61

Hatch

1. TITLE

The development of principles and practices for the control of weeds in cotton, peanuts, soybeans, forage crops, turf and for the control of nutsedge, Johnson grass and woody plants

2. DATE OF

ORIGIN
July 23, 1954

LAST REVISION

-

COMPLETION

July 5, 1959

3. REASON FOR TERMINATION

PROJECT COMPLETED LEADER LEAVING FUNDS TERMINATED LACK OF PRODUCTIVITY OTHER (Specify)

Major reorientation of objectives

4. ESTIMATE OF TOTAL PROJECT COST (given by sources of funds and amounts)

Research, \$18,070.02; Hatch, \$12,727.91; State, \$7,762.88. Total = \$57,060.81

5. INITIATING DEPARTMENT, OTHER DEPARTMENTS AND AGENCIES COOPERATING

Field Crops; Agr. Engineering; USDA, ARS, Crops Research Division

6. PROFESSIONAL PERSONNEL

Robert P. Upchurch, Orvin E. Rud

7. CRITICAL APPRAISAL OF DEGREE TO WHICH PROJECT OBJECTIVES WERE ACCOMPLISHED

Reasonable progress was made toward the development of practices for the control of annual weeds in cotton and forage crops as is evidenced by the increasing acceptance of these practices by North Carolina farmers. Some progress was made towards the development of practices for the control of annual weeds in peanut production. The principle of the pre-emergent weed control technique was firmly established for North Carolina conditions. Some of the soil factors which relate to the success of pre-emergent herbicide applications were evaluated.

8. MAJOR RESULTS AND CONCLUSIONS, INCLUDING FUNDAMENTAL & PRACTICAL BENEFITS DERIVED (use back page if necessary)

- Developed for North Carolina conditions techniques for controlling annual weeds during the first 5 to 7 weeks of cotton production thereby permitting mechanization (diuron at 3/4 lb./A or CIPC at 8 lbs./A as broadcast pre-emergence treatments).
- Developed for North Carolina conditions techniques for controlling annual broadleafed weeds in legumes (alfalfa, Ladino clover) (DNBP broadcast treatments; 1 1/2 lbs./A for seedling legumes, 3 lbs./A for established legumes).

(continued on back page)

9. PUBLICATIONS ISSUED AS A DIRECT OR INDIRECT RESULT OF WORK DONE ON THIS PROJECT (use back page if necessary)

- Field experiments conducted in North Carolina during 1953 and 1954 relating to weed control in peanuts. Sou. Weed Conf. Proc. 8:110-117. 1955.
- Field experiments conducted in North Carolina during 1953 and 1954 relating to weed control in soybeans. Sou. Weed Conf. Proc. 8:162-170. 1955.
- The influence of soil-moisture content on the response of cotton to herbicides. Weeds 5:112-120. 1957.
- The influence of soil factors on the phytotoxicity and plant selectivity of diuron. Weeds 6:161-171. 1958.

(continued on back page)

10. PREPARED BY

Robert P. Upchurch
Robert P. Upchurch

11. APPROVED (Director)

R. Johnson

12. APPROVED (Department Chairman)

Charles J. Mason

13. DATE

June 15, 1959

8. Major Results and Conclusions (continued)

3. Developed for North Carolina conditions techniques of intermediate effectiveness for controlling annual weeds in peanut production. (DNBP 9 lbs./A, sesone 4 lbs./A, 2,4-D 1½ lbs./A, NPA 4 lbs./A - applied as broadcast pre-emergence treatments).
4. Established for North Carolina conditions the pre-emergence method of weed control as a basic technique for controlling weeds in large seeded crop plants.
5. Evaluated the importance of soil-factors in influencing the toxicity of herbicides. Soil organic matter and phosphorus were found to be of critical importance.

9. Publications (continued)

5. The effect of soil nutrients on the phytotoxicity of herbicides. (Will appear in Weeds 7: Issue 1, 1959).
6. The influence of soil organic matter on the phytotoxicity of twelve herbicides. (with D. D. Mason). Manuscript in preparation.

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ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 59

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): HATCH H-61, THE DEVELOPMENT OF PRINCIPLES AND PRACTICES FOR THE CONTROL OF WEEDS IN COTTON, PEANUTS, SOYBEANS, FORAGE CROPS, TURF AND FOR THE CONTROL OF NUISANCE, JOHNSON GRASS AND WOODY PLANTS.
2. DEPARTMENTS AND COOPERATING AGENCIES:
Field Crops
3. PERSONNEL:
Robert P. Upchurch and Walter F. Haskins
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):
 - A. Greenhouse studies on the effect of soil organic matter (O.M.) on the phytotoxicity of 12 herbicides were completed. Toxicity was decreased by O.M. for all herbicides with 8 to 43 times as much herbicide being required at 17 per cent O.M. as to 0.5 per cent O.M. for equal phototoxicity, depending upon the herbicide.
 - B. Fourteen herbicides were tested for pre-emergent use in cotton, soybeans and peanuts. Some leads were developed but no new promising treatments were revealed.
 - C. The possibility of identifying a peanut mutant which would be tolerant to diuron or simazin was explored using 80 mutants. Results justify further work but improvements in technique are needed.
 - D. Continued efforts to increase the activity of DNBP applied post-emergent to peanuts were unsuccessful - dalapon as an additive to the DNBP spray injured peanuts.
5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

Further development of the O.M.-herbicide toxicity relationship should increase our ability to predict the conditions under which herbicides will be useful. Further work on the peanut mutant study may lead to a new technique for developing weed control treatments.
6. WORK PLANNED FOR NEXT YEAR: Conduct an expanded study on isolating a peanut mutant which is tolerant to simazin or diuron using a revised technique. Conduct a screening experiment for cotton, soybeans and peanuts using about 20 new herbicides. Conduct a special screening experiment for peanuts using approximately 40 herbicides.
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

Some Interactions Between Nutrient Level (N,P,K,Ca) and Diuron in the Growth of Cotton and Italian Ryegrass. By Bingham, S. W. and Upchurch, R. P. To appear in WEEDS, Issue 2. 1959.
8. Prepared by Robert P. Upchurch Approved _____ (Director).
Date February 20, 1959 Date _____

North Carolina

AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 58

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): Hatch H-61, THE DEVELOPMENT OF PRINCIPLES AND PRACTICES FOR THE CONTROL OF WEEDS IN COTTON, PEANUTS, SOYBEANS, FORAGE CROPS, TURF AND FOR THE CONTROL OF NUTSEED, JOHNSON GRASS AND WOODY PLANTS.
2. DEPARTMENTS AND COOPERATING AGENCIES:
Field Crops

3. PERSONNEL:

Robert P. Upchurch

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

A. Results on Development of Principles: Experiments on the effect of soil organic matter on the response of cotton to 12 herbicides have been about one-half completed. The amount of dalapon required to reduce dry weight by 50% varies from 14 PPMW on 0.5% O.M. soil to about 280 PPMW on 17% O.M. soil. For NPTC comparable rates are about .4 and 4 PPMW. Other herbicides are affected to an intermediate degree.

B. Results on Development of Practices: (1) 2,4-D cannot be used to control broadleaf weeds in soybeans. 1/16 lb./A reduced yield by about 80%. (2) Four commercial herbicides (NPA, Sesone, 2,4-D, DNBP) available for peanuts do not reduce yields when used at double the recommended rate. (3) Post-emergence toxicity of DNBP to grass is not affected by solution temperature, concentration of solution or day vs. night application, but size of grass is critical; grass beyond the two leaf stage is highly resistant. (4) Testing 25 chemicals at various rates utilizing peanuts, soybeans and cotton failed to reveal new effective uses for chemicals.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): Completion of the organic-matter-toxicity relationship should increase our ability to predict the conditions under which given herbicides will be useful. Results on soybeans will prevent farmers from using a dangerous material and results on peanuts will allow farmers to use the herbicides evaluated with confidence under special types of condition and with a broader choice of rates.
6. WORK PLANNED FOR NEXT YEAR: A. The soil-organic matter-toxicity study will be continued under field conditions using pre-emergence type applications.
B. The combined effectiveness of dalapon and 2,4-D or DNBP for the control of weeds in peanuts will be evaluated. The tolerance of 80 diverse genetic lines of peanuts to two herbicides will be established.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

None

8. Prepared by Robert P. Upchurch Approved _____ (Director).

Date March 3, 1958

Date _____

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19..... **57**

(Three copies to be given to the OES examiner)

1. PROJECT: (Fund, number, and title): **HATCH 61, THE DEVELOPMENT OF PRINCIPLES AND PRACTICES FOR THE CONTROL OF WEEDS IN COTTON, PEANUTS, SOYBEANS, FORAGE CROPS, TURF AND FOR THE CONTROL OF NUTSEDGE, JOHNSON GRASS AND WOODY PLANTS.**
2. DEPARTMENTS AND COOPERATING AGENCIES:
FIELD CROPS DEPARTMENT
3. PERSONNEL:
G. E. RUD AND F. L. STEVENS, JR.
4. PROGRESS OF RESEARCH HIGHLIGHTING PRINCIPAL ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked): **COTTON: Diuron at 1 and 1/2 and CIPC at 8 and 12 lbs. per acre gave effective early season weed control. No evidence of plant injury was evident with Diuron at 1 1/2 lbs., but CIPC produced stunting of cotton and thinning of stands on soils high in clay content. PEANUTS: An extensive testing program indicates that pre-emergence treatments with 2,4-D ester at 1 1/2 and 2 1/2 lbs., Sesone at 3 and 4 lbs., Alanap 3 at 4 and 6 lbs., or dinitro at 6 and 9 lbs. gave good and poor results in weed control, depending on environmental conditions at the site of the test. The early season injury to the crop did not adversely affect the yield. Post-emergence treatments with dinitro continued to look promising when applied before the grass seedlings had advanced beyond the early 2 leaf stage. The injury to the peanuts were quickly overcome. SOYBEANS: Dinitro at 6 and 12 lbs. and CIPC at 9 lbs. gave good weed control without reducing stand or yield. 4,2,4-DB and 4-MCPB used as a post-emergence treatment up to 8 ounces per acre was much less injurious than 2,4-D amine at 2 ounces. 2,4-D severely injured the plant at all stages prior to post-bloom stage. TURF: Meyers Zoysia was less tolerant to PBAS at 0.9 lbs. per acre than was Tifton Bermuda or tall fescue. Di Sodium Arsenate (di Met), KCCN, Sesone, and Neburon at recommended rates produced little to no injury to the three species.**
5. USEFULNESS OF FINDINGS (when results may justifiably be expressed in terms of public benefits): **Diuron and CIPC continue to have a place in a practical early season weed control program for cotton. The performance of a pre-emergence weed control treatment in peanuts cannot be predicted and the selection can usually be influenced by economics and previous experience.**
6. WORK PLANNED FOR NEXT YEAR: **The approach to problems encountered in cotton and peanut weed control will be directed more toward basic studies to try to determine causes for certain observed variations. A project leader change in personnel will be involved.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:
8. Prepared by Robert P. Danchure Approved by _____
The Influence of Soil Factors on the Phytotoxicity and Plant Selectivity of Diuron (in preparation) (Director).
Date 2/8/55 **The Influence of Soil-Moisture Content on the Response of Cotton to Herbicides (in preparation).**

North Carolina

AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19...⁵⁶

(Three copies to be given to the OES examiner)

- 1. PROJECT: (Fund, number, and title): **B-J, Sec. 9, 41, THE DEVELOPMENT OF PRINCIPLES AND PRACTICES FOR THE CONTROL OF WEEDS IN COTTON, PEANUTS, SOYBEANS, FORAGE CROPS, TURF AND FOR THE CONTROL OF NUTSEDGE, JOHNSON GRASS AND WOOD PLANTS**
- 2. DEPARTMENTS AND COOPERATING AGENCIES: **Department of Agronomy**
- 3. PERSONNEL: **G. E. Rud, L. B. Murray, F. Stevens Jr.**

4. PROGRESS OF RESEARCH HIGHLIGHTING PRINCIPAL ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

Cotton: Chloro IPC at 8 lb. and Karmex D.L. at 0.75 lb per acre, pre-emergence, gave effective early season weed control. CIPC at 12 lbs. produced some early stunting on high clay soils. Dalapon, at 3 lbs., as a post-emergence treatment at the early bloom stage appeared promising for late season grass control. **Peanuts:** Crag 1 at 3 lbs., 2,4-Dester 1 1/2 lbs., Premerge at 12 and 18 lbs., CIPC at 8 lbs. per acre, pre-emergence gave effective early season weed control with only temporary suppression to growth of crop. Premerge at 6 lbs. appeared promising when applied at from 10 to 16 days following planting. **Soybeans:** No materials gave acceptable weed control without injury. Monsanto's GRAX and COEC were ineffective as pre-emergence treatments on Norfolk sandy loam in this test. 2,4-D at 2 oz. did not appear to injure soybeans when applied at the first trifoliate leaf stage; 4 oz. reduced the stand. **Johnson grass:** Application of 900 lbs. active NaClO₂ in "Atlaside" applied in Sept. gave fair control of established plants. TCA at 125 and 187 lb. active per acre and NaClO₂ at 600 and 900 lb. when applied in May gave good control. Seedling plants were re-establishing on the fall treated area in late 1955. Corn, planted in May 1955 grew normally on fall treated plots.

5. USEFULNESS OF FINDINGS (when results may justifiably be expressed in terms of public benefits):

CIPC and Karmex D.L. appear to have potentials of fitting into a weed control program for cotton. Hoe time required for early season control has been reduced significantly. Post-emergence applications of Premerge, if performance continues, would perhaps be more acceptable by the grower than more unpredictable pre-emerge treatments, on peanuts.

6. WORK PLANNED FOR NEXT YEAR: 1. Continue field studies of promising materials on cotton and peanuts at several locations. 2. Conduct an evaluation program with newer herbicides on cotton, peanuts, soybeans. 3. Test several cultural and chemical methods for control of nutsedge and Johnson grass. 4. Screening test of herbicides for turf weed control.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

Weed Control in Cotton, 1956, N.C. Agric. Extension Service

8. Prepared by..... Approved..... (Director).

Date February 23, 1956

Date.....

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 55

(Three copies to be given to the OES examiner)

1. PROJECT: (Fund, number, and title): B-J Sec. 9, 41 THE DEVELOPMENT OF PRINCIPLES AND PRACTICES FOR THE CONTROL OF WEEDS IN COTTON, PEANUTS, SOYBEANS, FORAGE CROPS, TURF AND FOR THE CONTROL OF NUTSEDGE JOHNSON GRASS AND WOODY PLANTS
2. DEPARTMENTS AND COOPERATING AGENCIES: Research on Weed Control in Cotton is cooperative with Dept. of Ag. Eng., N.C. State College and Section of Weed Investigation A.R.S.
3. PERSONNEL: R. P. Upchurch, L. B. Murray

4. NATURE OF RESEARCH AND PRINCIPAL RESULTS OF THE YEAR (Confidential information should be so marked): Emphasis has been on the evaluation of herbicides which have shown promise for the control of weeds in Cotton, Soybeans and Peanuts. Nine acres of land were used for the purpose in 1954. 154 treatments were evaluated. Some of the treatments for Soybeans and Peanuts justify further research on them. Two chemicals [3(3,4 dichlorophenyl)-1, 1-dimethylurea and Isopropyl-N-(3 chlorophenyl)carbamate] were sufficiently promising for pre-emergence weed control in Cotton that they were evaluated at two locations in each of 6 counties in addition to the above location. Results were most promising and one additional year of such successful testing is needed before recommendations can be made for farmer usage.

Twelve characteristic soils have been used in the laboratory and greenhouse in an attempt to determine exactly which soil factors are responsible for the large amount of variability which is frequently obtained when herbicides are applied to soils. Attention is being given to such soil factors as Organic Matter, amount of clay, type of colloid, soil nutrients, pH, soil moisture, etc. The principal results of these studies are not yet available.

5. APPLICATION OF FINDINGS (expressed in terms of measurable public benefits if and when justified): If the two herbicides which show ^{promise} for use in cotton production are acceptable, one of the final steps in cotton mechanization will be realized. This would release farm workers who must be held on the farm for the entire year just to be present at the critical hoeing period.

6. WORK PLANNED FOR NEXT YEAR: New weed control treatments and treatments previously shown to be promising will be evaluated for use in soybean, peanut and cotton production. 7 acres of land will be used. Two herbicides will be tested for use in cotton at two locations in each of six counties. The soil-factor study described above will be carried to completion if possible.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

1. Field experiments conducted in North Carolina during 1953 and 1954 relating to weed control in soybeans. Southern Weed Conference Proceedings 1955 (In Press).
2. Field experiments conducted in North Carolina during 1953 and 1954 relating to weed control in peanuts. Southern Weed Conference. Proceedings 1955 (In Press)
3. Weed Control in Cotton - 1955. N.C. Extension Service Circular (In Press)
8. Prepared by R. P. Upchurch Approved _____

(Director).

Date February 23, 1955

Date _____

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION
PROJECT OUTLINE

Project No.	H-611
Date	
Submitted	March 2, 1954
Approved	July 23, 1954
Revised	

1. Title

The development of principles and practices for the control of weeds in cotton, peanuts, soybeans, forage crops, turf, and for the control of nutsedge, Johnson grass and woody plants.

2. Objective(s)

A. To develop for North Carolina conditions reliable, practical and economical practices for the solution of the above weed problems.

B. To develop principles of weed control particularly as related to weed control practices in North Carolina.

3. Reasons for undertaking Investigations*

The herbicidal phase of the agricultural chemical industry has expanded tremendously in the last few years. Discovery or rediscovery of the properties of certain groups of chemicals has enabled the farmer to solve certain weed problems more easily, predictably and economically than before. Farmers and Industrialists have benefited greatly from these developments and both groups are keenly interested in ways to solve those problems which have not yielded to the chemical approach. The agricultural chemists have responded by making available many commercial and experimental herbicides. The farmer has looked to his agricultural leadership for guidance in the use of these materials. Advice on such matters must be based on an experimental program. It is necessary for the researcher to adapt the use of commercial and experimental herbicides to North Carolina conditions. Also, recent advances in mechanical methods justify careful consideration. The availability of materials and procedures which have the potentiality, if guided by proper research, to greatly reduce the present high cost of controlling weeds provides adequate economic justification for the conduct of this project.

*Including economic justification

4. Previous work and present status of investigations in the field of this project:

Previous research having a bearing on the control of weeds in North Carolina has been reported largely in the regional weed control conferences of the United States. The research committee of the Southern Weed Conference has evolved "agreements" as to the best methods of dealing with many of the weed problems listed for this project (see latest research report). Some of these "agreements" describe North Carolina problems and solutions for them but have never been tried experimentally under North Carolina conditions. At this time there are no adequate cost comparisons of weed control measures which are believed to be most effective, nor have these measures been evaluated in the different crop producing regions of North Carolina. Further, many potential herbicides are being supplied which have received evaluation only under greenhouse conditions.

Information available on the control of weeds indicates that the knowledge of how to carry out weed control practices has expanded greatly in the last few years but that our knowledge as to the principles involved in these practices has increased at a much slower rate.

5. Outline of Procedure:

Research will be undertaken in the following categories for the development of practices (objective A).

A. Screening Studies -- The availability of so many unproven but potentially valuable weed control measures necessitates the establishment of experimental procedures which will permit the evaluation of many experimental entries. The details of experimentation will depend upon the specific problem attacked. Studies in this category will be made under field conditions in so far as possible.

B. Intensive Studies -- The comparison of new weed control measures with established procedures. General problems include: cost comparisons, effect of the practice on species which follow, impact of the practice on other operations which are customarily carried out in the solution of the problem at hand and the effect of the practice on yield and quality.

C. Extensive Studies -- The observation of new weed control practices under the conditions to which they will be subjected by their ultimate users. Observations of practices are to be made under diverse conditions as they are brought to the final stages of development. Studies will be made at as many locations as feasible.

Research will be undertaken in the following categories for the development of principles (objective B)

A. The study of soil factors as related to herbicidal efficacy - particularly as pertaining to uptake by the plant, selectivity, disappearance and susceptibility.

Factors include:

- | | |
|---------------------|-----------------------------|
| 1) Microbiological | 5) Soil physical factors |
| 2) pH | 6) Exchange characteristics |
| 3) Organic matter | 7) Etc. |
| 4) Mineral elements | |

B. The study of plant factors - Structure and function as related to herbicidal effectiveness. Including especially:

- 1) The relationship of age (annuals and seedlings) to susceptibility.
- 2) The relationship of stage of activity (of perennials) to susceptibility.

C. The study of climatic factors:

- 1) As related to behavior of herbicides in soils and plants.
- 2) As related to susceptibility of plants to herbicides. Factors include: Temperature, Rainfall, Humidity.

D. Life history studies of plants - as related to control methods. - facets include: Dormancy, Longevity, Reproduction (Vegetative and Seed), Seed behavior at varying soil depths, root systems, etc.

E. The study of properties of herbicides affecting their effectiveness - factors include:

- | | |
|--------------------|-------------------------------|
| 1) Wetting agents. | 3) Concentration of solution. |
| 2) Co-solvents. | 4) Pressure. |

The results of each study outlined will be proposed for publication in appropriate media according to the type of study and the results obtained.

6. Probable Duration of Project:

Five years.

7. Date of Initiation:

January 1, 1953.

8. Personnel:

Name	Department	Relation to Project
Robert P. Upchurch	Agronomy	Leader

9. Coöperation:

a. Interdepartmental

Dr. Henry D. Bowen - Agricultural Engineering

b. Other Agencies

Dr. Donald E. Moreland - USDA (Agronomy)

10. Financial Support:

a. Proposed Budget July 1, 1954 To June 30, 1955

Items	ALLOCATION OF FUNDS						
	Bankhead-Jones	R & M	Purnell	Adams	State	Other	Total
1. Salaries		6050 2000			770		9620
2. Labor		950			0		950
3. Travel					395		395
4. Equipment & Supplies		700			480		1180
5. All Others					195		195
Total		10,500			1,010		12,310

b. Proposed Future Budgets:

Year	Salaries	Total Expenditures	Estimated Income

11. General Remarks:

SIGNATURES OF APPROVAL

1. Approval of Project Leaders

Date July 11, 1954 Robert P. Upchurch
 Title Research Assistant Professor

Date

Title

Date

Title

2. Approval of Heads of Departments or Coöperating Agencies

Date July 12, 1954 L. J. York, Jr.
 Head, Dept. of Agronomy

Date

Head,

Date

Head,

3. Approval of Director

Date 7/15/54 R. W. Cunningham
 Director, North Carolina Agricultural
 Experiment Station

4. Approval of U.S.D.A.

Date JUL 23 1954 J. W. Wallington
~~Chief~~, Office of Experiment Stations

ACTING DIRECTOR
 STATE EXPERIMENT STATIONS DIVISION