UNIVERSITY OF CALIFORNIA
DIVISION OF AGRICULTURE OF NATURAL RESOURCES

CENTER I.D. No. 085
DATE RECEIVED 6-7-94

SIERRA FOOTHILL RESEARCH & EXTENSION CENTER
FINAL REPORT OF COMPLETED PROJECT

(This form is available on disk in WordPerfect 5.1 format)

1. Project Leader: Dan Brown Assoc. Prof. Anim. Sci. Davis
Name, Title, Department/Agency, Campus (or Location)
(916) 752-7184 U.C.D.
(Mailing Address and Telephone Number)

2. Project Cooperators:

Name, Title, Department/Agency, Campus (or Location)

3. Descriptive title of proposed research project:
Poison Oak Bio Control

4. Experiment Station Project or CEFS No. and Title:

5. Termination Date: 31 July 1994

6. Land and labor used by project during past three years:
(to be completed by Center Superintendent)

	1991-92	1992-93	1993-94
Labor Assigned	24	12	0
Labor Used	0	0	0
Land Assigned	0	0	0

7. Summary of research results: (include statement of how original objectives were met and relevance of research results to California agriculture)

1) Found that urushiol is not transferred to the milk or urine of ruminants consuming poison oak.

2) Rumen activity does not destroy urushiol, but saturates some sidearm double bonds.

3) Urushiol is found in the feces.

4) We have not yet ruled out urushiol/protein complexes in milk, but they are unlikely.

8. Publications, including unpublished reports to industry or funding agencies (in press and in preparation). List and provide copies.

Attached are a Cal Ag Article (an) an ADSA/ASAS abstract

Also- Brou Kouakou and Tom Tzeng completed their theses on this project

Kouakou, Brou 1991 Fate of Urushiol when Consumed by Dairy Goats. MS Thesis UC Davis

Tzeng, Chang Ching. 1993. Effect of 24, 48 or 72 hour in Vitro Rumen Fluid Incubation and Pepsin HCl Treatment on Poison Oak Urushiol MS Thesis UC Davis

PLEASE CONTINUE TO PROVIDE COPIES OF PUBLICATIONS RELATED TO THIS PROJECT AS THEY ARE PUBLISHED.

9. **SIGNATURE:**

Project Leader: Dan Brown

Date: 6 June 1994

DATE: 05/26/94

TO: Leaders of research projects scheduled to terminate
FROM: Mike Connor, Superintendent, Sierra Foothill REC

Our records show that your research project, described below, is scheduled to terminate. Please complete the enclosed form 'Final Report of Completed Project' and return it to me by July 1, 1994. This form is important because it helps to document the accomplishments resulting from the use of Center resources.

If you wish to continue your project, contact me.

This correspondence is in regards to the following project:

ID	Project Leader	Project Title	Hours Assigned 1993-94	Total Hrs Used 1993-94
085	BROWN	POISON OAK BIO-CONTROL	0	0

DATE: 07/11/93

TO: Research Project Leaders
FROM: Mike Connor, Superintendent, Sierra Field Station
REGARDING: Research labor hour use for the fiscal year

The following information relates to all station projects:
Total Research Hours Used to Date: 6585.50
Total Hours Assigned to Research: 7438
Percent Used of Assigned: 88.54

The remaining information relates to your particular project(s):

ID #	Project Title	Hours Used Qtr 1	Hours Used Qtr 2	Hours Used Qtr 3	Hours Used Qtr 4	Total Hours	Station Hours Assigned	Hours Paid by Project	Hours Balance
** Project Leader: BROWN									
085	POISON OAK BIO-CONTROL	0.00	0.00	0.00	0.00	0.00	12	0.00	12

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OFFICE OF THE PRESIDENT
Division of Agriculture and Natural Resources

SIERRA FOOTHILL RESEARCH AND EXTENSION CENTER
P.O. BOX 28
BROWNS VALLEY, CALIFORNIA 95918
(916) 639-2501; FAX (916) 639-2419

July 20, 1992

To: Leaders of Research Projects - 1991-92 Fiscal Year

From: Mike Connor

The enclosed printout lists the number of research labor hours charged to your project, or projects, during the fiscal year July 1, 1991, to June 30, 1992.

There will be no charge this year for hours used over the number assigned because station-wide fewer labor hours were used than were allocated. If you have questions, or would like a breakdown of how the hours charged to your project were used, call me. Thank you for doing research at Sierra Field Station.

Your project 85 was assigned 12 hours for the 1992-93 fiscal year for strictly research activities. Animal care hours will be provided in addition, if necessary.

DATE: 07/13/92

TO: Research Project Leaders
FROM: Mike Connor, Superintendent, Sierra Field Station
REGARDING: Research labor hour use for the fiscal year

The following information relates to all station projects:
Total Research Hours Used to Date: 8221.50
Total Hours Assigned to Research: 8500
Percent Used of Assigned: 96.72

The remaining information relates to your particular project(s):

ID #	Project Title	Hours Used Qtr 1	Hours Used Qtr 2	Hours Used Qtr 3	Hours Used Qtr 4	Total Hours	Station Hours Assigned	Hours Paid by Project	Hours Balance
* Project Leader: BROWN									
085	POISON OAK BIO-CONTROL	0.00	0.00	0.00	0.00	0.00	24	0.00	24

DANR: FACILITIES PLANNING & MANAGEMENT

ANNUAL REQUEST FOR LAND, LABOR AND FACILITIES

Sierra Foothill RESEARCH & EXTENSION CENTER

Center Identification No.: 85 Experiment Station Project No.: CAD 4989 AH
Project Leader: Dan Brown 2nd Contact Person: _____
Project Title: Poison Oak - livestock Interactions

This Request is For Period: Month/Year Jul/92 to Month/Year Jun/93 Proj. Termination Date Indef.

ITEM NO.	ITEM	SUPPLIED BY CENTER	SUPPLIED BY PROJECT
1.	Labor--estimated hours per year for all operations	12	120
2.	Land required (_____ft. x _____ft.) or acres assigned	//////////	//////////
3.	Research project area(s) by field name and number		
4.	Name of crop _____ Seed or planting mat'l		
5.	Row width in inches _____ No. of rows _____ Border width	//////////	//////////
6.	Is thinning in row req'd. _____ Spacing in inches	//////////	//////////
7.	Irrigation type: Sprinkle _____ Sprinkle to emergence _____ Furrow _____ Flood	//////////	//////////
8.	Irrigation water quality or quantity requirements: Describe if special features are required		
9.	Fertilizer--type(s) & amounts		
10.	Fertilizer--application methods		
11.	Weed control--mechanical: Normal _____ Special		
12.	Weed control--chemical: Type & rate _____ Pre plant _____ Post emerge		
13.	Insect control: Normal _____ Special		
14.	Soil fumigation requirements: Type & rate		
15.	Plot isolation requirements		
16.	Special location of facilities Calving Barn	1	0
17.	Special equipment or supplies needs-list & periods of use Modified Calf pens - McGregor type	1	0
18.	Frost protection requirements		
19.	Special rodent & bird control		
20.	Animal requirements: Type goat No. required 6 Season of use Summer	0	6
21.	Animal feeds: Type _____ Amount _____ When required		X
22.	Veterinary supplies: Type _____ Amount		
23.	Fencing requirements		
24.	Laboratory or other facilities Due to nature of sample, will process at Davis...		X
25.	Greenhouse--bench space in sq. ft. _____ Season of use _____ Temperature or humidity requirements	//////////	//////////
26.	Screenhouse--bench space in sq. ft. _____ Season of use	//////////	//////////
27.	Lath-house--bench space in sq. ft. _____ Season of use	//////////	//////////
28.	Animal barns 700 sq. ft., X Season of use Summer	//////////	//////////
29.	Animal water facilities: Normal _____ Special		
30.	Records Needed: Weather _____ Irrigation _____ Other		

31. Unregistered (experimental) compounds and/or Category I pesticides (see list attached to Implementation Procedures for Communication 15) to be used--list. Researcher is required to submit MSDS or comparable fact sheet to Center Superintendent before compound is brought onto Center. NO

32. Carcinogenic compounds or radioactive materials--list. Evidence of campus approval of project must be submitted. NO

33. Does project involve recombinant DNA? NO Submit documentation of campus approval of the project.

34. Field modifications required for project--prepare description in conjunction with Center Superintendent (must include cost estimate, special equipment requirements and funding information). Not This year

35. Other requests:

DISPOSAL OF UNUSED HAZARDOUS MATERIAL AND UNREGISTERED COMPOUNDS, AND HAZARDOUS WASTE GENERATED FROM ALL ASPECTS OF PROJECT SHALL BE THE RESPONSIBILITY OF THE RESEARCHER.

Project Cost Information:

a. Project Leader and the fiscal control unit will accept recharges for:

1. Labor hours used in excess of those assigned: Yes X No
   Dollar limit: $500
   Account to be recharged: 8207
   Loc. Account Fund Sub
   Account Name: Animal Health Grant NO. CA-DK-ASC-4989 AH

2. Center cost for materials and services on project: Yes No
   Dollar limit: $
   Account to be recharged:
   Loc. Account Fund Sub
   Account Name:

Project Leaders will be given a quarterly report of the charges, if any, to their project.

Dan Brown
Project Leader Signature

J. O'Price
Authorizing Signature

The following authorizing signatures are required:
1. For Faculty and campus Specialists: Department Chair
2. For Farm Advisors: County Director
3. For other State & U.S. agencies: Administrative unit head and cooperating Department Chair
4. All other research projects: Regional Director

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P.O. BOX 28
BROWNS VALLEY, CALIFORNIA 95918
(916) 639-2501; FAX (916) 639-2419

May 15, 1992

To: Leaders of research projects at Sierra Field Station

From: Mike Connor

Re: Call for land, labor and facilities requests

Please indicate the requirements for your research project(s) for the 1991-92 fiscal year on the enclosed form(s), "Annual Request for Land, Labor and Facilities".

As we discussed at the RAC meeting last June, beginning this year project leaders will be responsible only for labor hours utilized in strictly research activities. Projects will not be charged for research animal care and pasture maintenance as in the past.

You will be allocated, and charged for, only strictly research labor hours. To help estimate the amount of hours for next year, I have enclosed, or listed below, a summary of hours used during the current year. Please explain any increase requested over the current year's level. Call me if you have questions.

Be sure to complete page 2, with required signatures.

Please return the form(s) to me by May 30, 1992, so the requests can be reviewed by the Research Advisory Committee members before the meeting. Requests received after the deadline may receive lower priority for labor hours.

You are invited to the RAC meeting on June 9 at the Station.

Hours used during 1991-92 fiscal year: 0

Enclosures: Annual Request Form

Ref:annualLLF.92

U.C. Sierra Foothill Research & Extension Center, Annual Progress Report

Project Title: Range/Pasture Plant Material Evaluation

Two research projects exist at the site: 1) evaluation of experimental strains of annual legumes, and 2) a yellow starthistle seedbank depletion study.

Legume experimental strains planted: 45 entries -- 17 subclovers + 3 ssp. brachycalycinum & 1 ssp. yanninicum, 6 rose clovers, 1 crimson, 2 cupped clovers, 1 balansae, 1 arrowleaf, 4 burclovers, 1 M. murex, 1 M. tornata, 2 M. lacininata, 1 Hedysarium, 2 Ornithopus.

Due to autumn and winter drought and a severe December freeze (mid-teens), legume establishment was generally poor. However, several experimental strains did very well including: five rose clovers (mean % cover, 55-78%), "Paradana"/balansa clover, Trifolium balansae (mean % cover, 85%) and "Seelu"/arrowleaf clover T. vesiculosum (mean % cover 90%). One of the best performing rose clovers (from Ray Smith, Texas) and the two other clovers (from Seedco, Australia) are previously untested in California.

The legume plots are superimposed over a yellow starthistle seed-bank study site. Studies are underway to determine the rate of seedbank depletion, once seed production and deposition are halted. The site is heavily infested with yellow starthistle and eradication measures are being attempted. Several pre- and postplant treatments (pre-irrigation, herbicide, cultivation, mowing, and removal of surviving starthistle plants with shovel) were done that have reduced the density of starthistle and improved what legume establishment did occur.

DATE: 07/05/91

TO: Research Project Leaders
FROM: Mike Connor, Superintendent, Sierra Field Station
REGARDING: Research labor hour use for the fiscal year

The following information relates to all station projects:
Total Research Hours Used to Date: 8227.50
Total Hours Assigned to Research: 9424
Percent Used of Assigned: 87.30

The remaining information relates to your particular project(s):

ID #	Project Title	Hours Used Qtr 1	Hours Used Qtr 2	Hours Used Qtr 3	Hours Used Qtr 4	Total Hours	Station Hours Assigned	Hours Paid by Project	Hours Balance
* Project Leader: BROWN									
085	POISON OAK BIO-CONTROL	0.00	0.00	7.50	2.00	9.50	30	0.00	20

Project 85 has been assigned 24 hours for the 1991-92 fiscal year.

DANR: FACILITIES PLANNING & MANAGEMENT

ANNUAL REQUEST FOR LAND, LABOR AND FACILITIES

SIERRA FOOTHILL RESEARCH & EXTENSION CENTER

CA-D-4989AH

Center Identification No.: 85 Experiment Station Project No.: [redacted]
Project Leader: Dan Brown 2nd Contact Person: _____
Project Title: Elimination of barriers to safe, sustainable control of poison oak by goats.

This Request is For Period: Month/Year July 91 to Month/Year June 92 Proj. Termination Date _____

ITEM NO.	ITEM	SUPPLIED BY CENTER	PROJECT
1.	Labor--estimated hours per year for all operations	24	Balance Needed
2.	Land required (_____ft. x _____ft.) or acres assigned	//////////	//////////
3.	Research project area(s) by field name and number		
4.	Name of crop_____ Seed or planting mat'l_____		
5.	Row width in inches_____ No. of rows_____ Border width_____	//////////	//////////
6.	Is thinning in row req'd._____ Spacing in inches_____	//////////	//////////
7.	Irrigation type: Sprinkle_____ Sprinkle to emergence_____	//////////	//////////
	Furrow_____ Flood_____	//////////	//////////
8.	Irrigation water quality or quantity requirements: Describe if special features are required_____		
9.	Fertilizer--type(s) & amounts_____		
10.	Fertilizer--application methods_____		
11.	Weed control--mechanical: Normal_____ Special_____		
12.	Weed control--chemical: Type & rate_____		
	Pre plant_____ Post emerge_____		
13.	Insect control: Normal_____ Special_____		
14.	Soil fumigation requirements: Type & rate_____		
15.	Plot isolation requirements_____		
16.	Special location of facilities_____		
17.	Special equipment or supplies needs-list & periods of use		
18.	Frost protection requirements_____		
19.	Special rodent & bird control_____		
20.	Animal requirements: Type____ No. required____ Season of use___		
21.	Animal feeds: Type_____ Amount_____ When required_____		
22.	Veterinary supplies: Type_____ Amount_____		
23.	Fencing requirements_____		
24.	Laboratory or other facilities_____		
25.	Greenhouse--bench space in sq. ft._____ Season of use_____	//////////	//////////
	Temperature or humidity requirements_____	//////////	//////////
26.	Screenhouse--bench space in sq. ft._____ Season of use_____	//////////	//////////
27.	Lath-house--bench space in sq. ft._____ Season of use_____	//////////	//////////
28.	Animal barns 500± sq. ft., Season of use Spring/Summer	//////////	//////////
29.	Animal water facilities: Normal ✓ Special_____		
30.	Records Needed: Weather_____ Irrigation_____ Other_____		

31. Unregistered (experimental) compounds and/or Category I pesticides (see list attached to Implementation Procedures for Communication 15) to be used--list. Researcher is required to submit MSDS or comparable fact sheet to Center Superintendent before compound is brought onto Center. _____

32. Carcinogenic compounds or radioactive materials--list. Evidence of campus approval of project must be submitted. NO

33. Does project involve recombinant DNA? NO Submit documentation of campus approval of the project.

34. Field modifications required for project--prepare description in conjunction with Center Superintendent (must include cost estimate, special equipment requirements and funding information). None at this time

35. Other requests: Drag calf pens into calving barn. Next time we will habituate does to similar pens down in Davis First.

DISPOSAL OF UNUSED HAZARDOUS MATERIAL AND UNREGISTERED COMPOUNDS, AND HAZARDOUS WASTE GENERATED FROM ALL ASPECTS OF PROJECT SHALL BE THE RESPONSIBILITY OF THE RESEARCHER.

Project Cost Information:

a. Project Leader and the fiscal control unit will accept recharges for:

1. Labor hours used in excess of those assigned: Yes X No
   Dollar limit: $ 500 - negotiable if need be
   Account to be recharged:
   Loc. Account Fund Sub
   Account Name: 8417 Dept Allocation or grant

2. Center cost for materials and services on project: Yes X No
   Dollar limit: $ 500 - negotiable if need be
   Account to be recharged:
   Loc. Account Fund Sub
   Account Name: 8417 Dept Allocation or grant

Project Leaders will be given a quarterly report of the charges, if any, to their project.

X Dan Brown
Project Leader Signature

X Eric Bradford
Authorizing Signature

The following authorizing signatures are required:
1. For Faculty and campus Specialists: Department Chair
2. For Farm Advisors: County Director
3. For other State & U.S. agencies: Administrative unit head and cooperating Department Chair
4. All other research projects: Regional Director

3-440332-37336-5

Noel Endowment Fund

Dan Brown

#ID 0354

4/11/91 #55 for dorm recharged.

3/26/91

- Dan Brown - 752-7184 (campus) / 758-9736 (home) / 752-1250 (Dept)
- Brov Kovakov (Pauline) at dorm 3/26 →
- Recharge Dorm @ excess hours (30-2) to 0354 (ID) will provide acct + fund
-

UNIVERSITY OF CALIFORNIA, DAVIS
RECHARGE BILL

№ 57250

REF. # 43 – 48

Date 4/11/91

Service Department Name:	Service Period
DANR, OFP&M - Sierra	Mo. 04 Yr. 91
25 - 42	20 - 24

INSTRUCTIONS: For use by Recharge Departments only. The form need only be approved by the originating Recharge Department. Forward only the White and Yellow copies to the Accounting Office.

DESCRIPTION OF MATERIAL AND/OR SERVICE	BLANKET ORDER NO.	AMOUNT
Dorm rent, 11 days @ $5 (3/26 - 4/5/91)		$55.00
Dan Brown		
ID # 0354		
Noel Endowment Fund		
	TOTAL	55.00

C. Hollingsworth 639-2501
Prepared By Tel. Ext.

I hereby certify that the above recharges pertain to services and/or materials that have been rendered to the listed department. Detailed records of the charges are on file in this service department and are available for audit.

Signature Date

Name Account Charged: Dept Animal Science

Charge Account Coding	L	Number	Fund	Sub	Object	Amount
	3	440332	37336	5		55.00

Name Account Credited DANR, OFPM Recharge Acad Dept

Credit Account Coding	L	Number	Fund	Sub	Object	Amount
	L	440381	19900	9	3900	55.00

White – Accounting (*) 10 Years *Yellow* – Department Charged 1 Year *Pink* – Retained by Recharge Department 1 Year

D2321 (6/86) Form No. D-17
CAL-CODE 71461-178

19 Feb 91

Dr. Phil Tillman
Campus Veterinarian
EH & S

Dear Sir:

I would like to request that our approved protocol number 4348 be expanded to permit carrying out the goat feeding trial at the Sierra Field Station in Browns Valley.

We will use the same equipment, procedures and goats, but delivery of poison oak foliage and protection of human personnel will be much easier at Sierra. We found that we could not cut and haul poison oak brush to Davis fast enough to carry out the trial. Also, people unrelated to the project were put at risk of delayed hypersensitivity dermatitis when we conducted these trials at Davis.

Thank you for your consideration and support of this and many previous projects.

Sincerely,

Dan Brown

Biohazard ___ yes ___X___ no | Radioisotope ___ yes ___X___ no | Chemical Carcinogen ___ yes ___X___ no

Agent _____ | Agent _____ | Agent _____

PROTOCOL FOR ANIMAL USE AND CARE

Form must be typewritten

EH&S USE ONLY
PROTOCOL # 4348
EXPIRES AUG 2 2 1993

1. Investigator: Dan L. Brown Dept. ANIMAL SCIENCE Phones: (916) 752-7184 / (916) 758-9736

Co-Investigator: _____ Dept. _____ Phones: _____ / _____

Technician _____ Phones: _____ / _____

Student Brou Kouakou Phones: (916) 756-3953

_____ Phones: _____ / _____

2. Species (common names): Goats Estimated numbers per year: 6

3. Location of Animal Housing (bldg. & rm. or vivarium): a. overnight Goat Barn b. day use only _____

4. Proposed duration of project: 3 years. (1 to 5) 5. Funded by: _____

6. Project Title or Course Name and Number: _____

Effects of Poison Oak on Goats Milk

7. Abstract of Research/Teaching Plan for the information of the animal facilities staff.
In the space provided, give a *brief layman's description* of the procedures employed on the animals in this project.

Six lactating goats will be fed poison oak free choice for a week, followed by a standard alfalfa/corn/cottonseed ration for the following three weeks. Milk, feces, and urine samples will be taken from the animals daily.

8. Special Requirements for maintaining the animals: X no ___ yes. If yes, indicate your requirements below. If you have no special requirements, animals will be maintained according to the standard operating procedure of the vivarium.

a. Temperature range (°F): _____ ; humidity (%): _____ ; light cycle: _____ ; hrs light: _____ ; hrs dark: _____

b. Caging: type _____ ; size _____ , filter tops? _____ ; cage changes/week: _____

c. Bedding/litter: type _____ ; autoclaved? _____ ; bedding changes/week: _____

d. Type of water (e.g., sterile, deionized, acidified, tap) _____

e. Diet and Feeding Requirements: What diet? Experimental diet or standard ration

If other than ad lib feed and water, state amounts: _____

f. Other Special Instructions for Animal Care Staff: Animals are to be fed and cared for by Brown and Kouakou only.

9. Check all applicable boxes:

Instructions for Disposition of Sick Animals:

X Call Investigator
___ Clinician to treat
___ Terminate

Instructions for Disposition of Dead Animals:

X Call Investigator
___ Necropsy
___ Bag for disposal

Pest Control:

X None
___ Pest Strip
___ Pyrethrin
___ Other (specify)

UNIVERSITY OF CALIFORNIA APPROVED I.A.C.U.C. DAVIS

10 Summary: Provide an expanded summary to describe your work to the Animal Use and Care Committee. Include 1) Objective and significance of the project/course; 2) A description of the procedures to which the animals will be subjected, 3) Your reasons for selecting the species and number of each species used. You may attach a grant abstract, teaching syllabus or reprint in addition to the summary below, but *you must still provide a summary statement in the space provided*. Use language appropriate for a biologist *outside* your field.

Poison oak foliage will be fed to six lactating goats for one week, then replaced by a standard ration for the following three weeks. Foliage, milk, feces, urine samples will be collected and prepared for urushiol analysis. The objectives is to determine the presence and identity of urushiol metabolites in the milk from goats fed poison oak. From the results of this experiment, a second experiment will be designed to determine the intensity and duration of browsing by goats needed for optimum suppression of T. diversilobum growth and proliferation in open fields.

The main objective of the experiment at the UCD Goat Barn is to determine the presence and identify urushiol metabolites in goat milk.

11. If you are using wild or exotic species, have you obtained the necessary permits? _____ yes _____ no __X__ not applicable

12. Will non-surgical invasive manipulations be performed? (blood collection, catheterization, intubation, etc.) __X__ no ___ yes.

If yes, describe: _____

_____

13. Will the animals be restrained by chairs, slings, tethers, stanchions, metabolism cages, or other devices? X no ____ yes.
If yes, please describe:

a. Method of restraint: _____

b. Duration of restrain (in hours/days): _____ c. Frequency of restraint: _____

c. How frequently will the animals be observed during restraint? _____

14. Will the animals be fasted? __X__ no _____ yes.

Duration of fast? _____ How often will a single animal be fasted? _____

15. Are surgical procedures employed? __X__ no _____ yes. If yes, complete this section.

a. Check the statement that describes your project:

_____ Terminal (animals are killed under anesthesia without regaining consciousness)

_____ Survival (animals regain consciousness after anesthesia)

_____ Multiple Survival (individual animals may undergo more than one survival surgery)

b. Location (bldg/rm) of surgical suite: _____

c. Describe the surgical procedure(s):

15. (cont.)

d. Describe the post-operative care (Survival procedures only)

Where are the animals held post-operatively? _____

Who is responsible for observing the animals post-operatively? _____

How frequently are the animals observed and monitored post-operatively? _____

16. Are any anesthetics, analgesics, or tranquilizers used in this project? _X_ no ____ yes.
If yes, please provide the information requested below.

Species	Drug	Dose (mg/kg)	Route	Times/day	# of hours/days

17. Are any neuromuscular blocking agents used in conducting this project? _X_ no ____ yes.
If yes, complete the following:

Species	Drug	Dose (mg/kg)	Route	Times/day	# of hours/days

a. If neuromuscular blocking agents are used only in conjunction with anesthesia:
What physiologic parameters are monitored during the procedure to assess adequacy of anesthesia?

Under what circumstances will incremental doses of anesthetics-analgesics be administered?

b. If the neuromuscular blocking agents are being given without general anesthesia, please specifically justify the practice on page 4 under Item 19, a. and c.

18. Veterinary Care: Who will provide veterinary care for your animals? ____ ARS Clinic

____ CPRC Therapeutics ____ IEHR Hospital _X_ VMTH Ambulatory Service

____ Other _____ / _____
Name of other veterinarian/clinic *telephone*

19. Justification: This section is required for any project in which there is a potential for pain or distress that cannot be alleviated. Examples include disease states induced by chemical, physical, or biological agents; toxicology studies, surgical studies in which there is either significant post-operative discomfort or a significant post-operative loss of function; induction of nutritional excess or deficiency states; etc.

a. Describe any pain/distress/discomfort that may be associated with your procedures.

None

b. Is death an endpoint in this project? If not, describe the conditions under which you would euthanatize and animal under study. If death is a necessary endpoint, please explain why the animals cannot be euthanatized at some earlier point in the study.

No

c. Explain why it would be inappropriate to administer anesthetics, analgesics or other methods to alleviate pain or discomfort.

No pain

20. Completion of Project:

a. Method of euthanasia: Please indicate the method you would use, even though you may not actually need to terminate the animals. No euthanasia anticipated

Species	Method
Capra hircus	Captive bolt stun followed by dual jugular exsanguination

b. What will you do with any animals not euthanatized at the conclusion of the project?

Return to herd (after milk shampoo and rinse to protect regular staff from any residual urushiol)

21. Alternatives to Animal Use:

a. Are there any non-animal alternatives to the use of animals for this project? X no _____ yes

b. If yes, explain why the alternatives cannot be used in this project.

PROTOCOL # 4343

22. Assurances for the Humane Care and Use of Vertebrate Animals:

Principal Investigator's Statement:

I have read and agree to abide by the UC Davis Policy and Procedure Manual section 290-30. The project will be conducted in accordance with the NIH *Guide for the Care and Use of Laboratory Animals* except as explained above. Copies of the NIH *Guide* may be obtained from the Office of the Campus Veterinarian. I will abide by all federal, state, local laws and regulations governing the use of animals in research.

I will advise the Animal Care and Use Administrative Advisory Committee in writing of any significant changes in the procedures described above.

[illegible] / Associate Professor / 7-25-90

Principal Investigator/Course Instructor / *Title/Rank* / *Date*

Department Chair/Dean/Director:

The personnel conducting this project are appropriately qualified and trained in the subject area under study. Personnel with substantial animal contact, as defined by the Campus Occupational Health Service, are required to participate in a medical surveillance program (refer to UCD P&P Manual 290-25).

W. H. Hartt / 7-25-90

Dept. Chair (Dean/Director if applicable) / *Date*

Campus Veterinarian:

The type and amount of analgesic, anesthetic, or tranquilizing drugs shown above are appropriate by current professional standards to relieve pain and distress for the animals, except as justified above by the investigator. Methods of euthanasia are compatible with recommendations of the AVMA panel on euthanasia (JAVMA, Feb. 1, 1986).

Phil Tillman D.V.M. / AUG 22 1990

Campus Veterinarian / *Date*

COMMITTEE USE ONLY BELOW

** Conditions Necessary for Committee Approval:

Final Disposition of this protocol:

X Approved.

____ Not Approved

____ Withdrawn by Investigator

Date of Action: AUG 22 1990

NOTIFICATION OF RESEARCH ADVISORY COMMITTEE RECOMMENDATION

Center ID 85

TO: Dan Brown Date 6/29/90

Department Animal Science Campus Davis

The Research Advisory Committee for the Sierra Foothill Range Field Station has reviewed your proposal, Elimination of barriers to safe, sustainable control of poison oak by goats.,

to be conducted under Experiment Station project number CA-D-ASC 4989AH

The committee has recommended:

+-+
+-+ (1) approval of the proposal as submitted for initiation on 7/1/90 _____
or a period of _____ (months) (years)
termination date 6/30/93 (Continuation beyond this date will require review by the Research Advisory Committee.)

+-+
+-+ (2) approval, providing the following condition(s) are satisfied:

Project Leader obtaining:
1) Animal use protocol
2) Human subjects protocol
3) Annual check list
4) Experiment Station number

+-+
+-+ (3) rejection for the following reason(s):

Center resources assigned to your project for the ~~oaxkxxdaxxxxxxx~~ 1990-91 fiscal year

(a) Labor: 480 hours valued at $_____
(b) Land: 46 acres
(c) Buildings: Greenhouse _____ sq. ft. Lathhouse _____ sq. ft.

In accordance with each station's procedures, labor used beyond assigned hours will be recharged at the approved overage rate.

You are reminded also that any instruction concerning your project should be left with the Center Superintendent only. Please check with the Center Superintendent at your earliest convenience to work out the details of timing and land assignments.

COMMITTEE CHAIRMAN STATION SUPERINTENDENT REGIONAL DIRECTOR

Copies to: Researcher
Center Superintendent
Regional Director

AGRICULTURAL FIELD STATIONS Station Identification No. 85

RESEARCH PROJECT PROPOSAL

SIERRA FOOTHILL RANGE FIELD STATION

1. Project Leader: Dan Brown, Assistant Professor, Animal Science, UCD
Name, Title, Department (or Agency), and Campus (or Location)
Animal Science Dept., University of California,
(Mailing Address and Telephone Number) Davis, CA 95616
752-7184

2. Project Cooperators: William L. Epstein - Prof. Dermatology, UCSF
Elay Rodriguez - Prof. Cell Biol, Phytochem & Tox, UCI
(Name, Title, Department, and Campus or Location)

3. Descriptive title of proposed research project:

Elimination of barrrers to safe, sustainable control of poison oak by goats.

4. Experiment Station Project No. and Title: CA-D-ASC 4989AH
Modification of Animal Metabolism by Forage

5. Proposed Initiation Date: Termination Date: Date Approved:
1 July / 90 30 June / 93 / /

6. Justification statement. Include economic, biological or environmental importance. Indicate urgency and why it should be done at this Station.

Please see attached proposal page 2.

7. Previous work and present outlook: (The status of current research)

Please see attached proposal page 4-6

FHM138.WMD

8. Objectives:

See attached proposal page 2.

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9. Procedure: (A statement of the essential working plans and methods to be used in reaching objectives as stated above.) Include experimental design(s), data to be collected, statistical methods of evaluation, plot layouts, and any potential expansion of the project.

See attached proposal pages 7-9

For [redacted] required of station personnel, see page 10, 12

1) Move, treat animals and equipment 1990-1991 → 400h (daily care 1h/d + 340h fence building)

2) Clear poison oak from selected plots 1990-1991 → 480h

[redacted] for 1990-1991

480h

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10. Will unregistered chemicals no category 1 materials no recombinant DNA no or animal protocol yes be part of this project?

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11. Signature block:
Project Leader: Dan Brown

I have reviewed this proposal and approve it as appropriate research for this investigator and field station.

Authorizing Signatures: X William N Garrett Department Chair
Signature Title

Signature Title

The following authorizing signatures are required:
1. For faculty: Department Chair
2. For Cooperative Extension specialists: Program Director
3. For Farm Advisors: Program Director & County Director
4. For other State & U.S. agencies: Administrative unit head and cooperating Department Chair
5. All other research projects require approval of Director, Agricultural Field Stations

FHM138.WMD

Date Submitted: 30 April 1990

Title: Elimination of barriers to safe, sustainable control of Toxicodendron diversiloba (poison oak) by Capra hircus (goats).

(A new research proposal to the Statewide UC IPM Project for nonchemical pest management)

Principal Investigator: Dan L.Brown
Assistant Professor and Nutritionist
Animal Science Department
University of California
Davis, California 95616

Cooperator: William L. Epstein
Professor
Dermatology Department
University of California
San Francisco, California 94143

Cooperator: Eloy Rodriguez
Professor
Developmental and Cell Biology
University of California
Irvine, California 92717

Budget Total for 1990-1991 only: $27,785

Expected duration of project: Three years

IPM workgroup most appropriate for reviewing this proposal:

BIOLOGICAL CONTROL

Signatures:

Principal Investigator: Dan Brown Date 26 April 90
Dan Brown

Department Chair: W N Garrett Date 5-1-90
W. N. Garrett

OBJECTIVES:

1) Determine the intensity and duration of browsing by goats needed for optimum suppression of T. diversilobum growth and proliferation.

2) Determine the presence and identity of urushiol metabolites in the milk and meat from goats browsing poison oak.

3) Test the efficacy of a topically-applied organo-clay for prevention of poison oak dermatitis under field conditions.

4) Present information needed by the public for immediate implementation of this biological control system on California rangelands.

JUSTIFICATION:

Poison oak and poison ivy dermatitis has been estimated to cause 152,000 lost work days each year in the United States (Veitmeyer 1986). The jobs of many workers (farmers, ranchers, rangers, foresters, fire fighters, utility workers, etc.) involve unavoidable contact with these potent toxic agents. Woodland recreation leads to even more suffering due to poison oak and ivy. As more and more of the population of California moves into the foothill areas of the State to live and recreate, we can expect increases in non-work-related exposure to poison oak and the debilitating dermatitis that often follows. Since abandonment of all lands in which poison oak is found (or could spread to) would mean the surrender of much (if not most) uncultivated land below 5000 feet elevation, some type of control is needed to prevent continued and increased suffering from poison oak dermatitis.

Chemical options for the control of poison oak are expensive and limited. Triclopyr ester (sold by Dow chemical as Remedy) may only be applied to grazing land at a rate of one pound per acre, far too little to remove dense, well-established stands of poison oak. Exceeding this level of application necessitates a one year ban on grazing livestock. Other triclopyr and triclopyr/2,4-D formulations are approved for forest land, but not for grazing lands. Glyphosate herbicides (such as Roundup) are not only much more expensive, but also much less specific in what they kill. General broadcast of a product such as Roundup requires a two month wait before stock can be returned to an area and may result in the destruction of valuable, non-target plants. The very effective 2,4,5-T is no longer legally available for the control of poison oak.

Goats have been used successfully for years to control low growing brush and regrowth of larger woody plants after suppression by fire or mechanical means (Davis, et al. 1974, Sidahmed, et al. 1982). Unfortunately, this success has been limited to very few locations. To be an economically sustainable brush control option, goats must return enough income from meat, milk, hair, or direct rental payments to offset the costs of predator control, labor, herding, health care, nutritional supplementation and general management. Additional problems specific to attempts at poison oak control include the danger of dermatitis in herders caused by contact with urushiol (the toxic principal of poison oak) adhering to animals' bodies and the unknown effects on humans of ingested urushiol and related metabolites that might be found in the meat and milk. Since any one of these barriers can prevent the success of a goat-based biological control system, this project is an integrated program to provide the information needed to solve each of them.

THE OVERALL GOAL OF THIS PROJECT IS TO CREATE A COMPLETE LOW-INPUT BIOLOGICAL CONTROL SYSTEM FOR EARLY IMPLEMENTATION OF GOAT BROWSING TO CONTROL POISON OAK.

The three research components are specifically justified as follows:

Objective 1 will be met by the use of predator-resistant flocks of goats to browse both mature and regenerating stands of poison oak to ensure suppression and prevent proliferation. Additional nutritional needs beyond those provided by poison oak will be met by sufficient supplementation to maintain body condition and prevent the depletion of non-target species.

This component is justified by the production of quantitative information needed to determine how many goat-days are required to control a given quantity of poison oak. The demonstration of novel non-chemical techniques used to control predators represents an important secondary benefit of this research.

Objective 2 will be met by collecting milk and meat from goats browsing poison oak and from other goats at timed intervals after withdrawal from poison oak. These foods will be examined by HPLC for the presence of urushiol and its analogs and catabolites. This component will test the following hypotheses:

A) Urushiol and its catabolites will be found in the milk, meat and liver of goats browsing poison oak.

B) The principal urushiol class found in poison oak (heptadecaenylcatechols) will be converted to the corresponding saturated heptadecaalkylcatechol before appearing in the milk or meat.

This component is justified by establishing once and for all if the toxic principal of poison oak is passed into the milk of ruminants, if the urushiol is converted by biohydrogenation to the less potent saturated form and if any of the urushiol metabolites previously associated with oral desensitization to poison oak can be found in human food products from animals browsing poison oak. This work lays the groundwork for a more basic experimental investigation of the effects of specific food borne urushiol metabolites on amplification and suppression of urushiol-specific T-cells and on other factors involved in the poison oak dermatitis.

Objective 3 will be met by a double blind test in which project workers (and other volunteers from the Sierra Foothill Range Field Station, SFRFS) will apply an organo-clay compound or a control ointment to their exposed skin before working in areas where they might accidentally contact poison oak. This represents a field test of a material known to be 95.3% effective in blocking urushiol dermatitis under controlled laboratory conditions.

This component is justified by the possibility of demonstrating a technique that permits the contact between herdspersons and goat browsing poison oak with reduced danger of dermatitis. This technique may also be useful for a variety of other professions that require contact with urushiol.

Objective 4 will be met by open display of the research in progress at the Sierra Foothill Range Field Station, public involvement at every stage of this research, presentation of results at SFRFS and Dairy Goat field days and publication of results in California Agriculture, Cooperative Extension bulletins and refereed journals.

This component is justified by the educational benefits of making students, producers and consumers a part of the research from the beginning. The compilation of questions and comments of people visiting the research site will ensure that answers to their questions and concerns will be included in subsequent publications. Early framing of model control systems will enhance the use of data collected later in the project and hasten the publication of a complete system which meets the overall goal of this project. Publication of the medical and biochemical results ensure that the scientific community can make early use of this information as well.

PREVIOUS WORK:

Vegetation control

Goats have been used by Western ranchers for generations to

suppress the growth of chaparral, prevent fires and enhance cattle range. Recently documented experimentation include studies on the control of Gambel oak (Davis, et al. 1974, Nastis and Malechek 1981) by goats on cattle range and of several chapparal species (Sidahmed et al. 1981, Sidahmed et al. 1982) by goats in fire breaks. The latter study showed that while some reduction in chapparal cover was accomplished by Spring browsing, a second browsing in Summer practically eliminated the percentage of ground covered by palatable species. Unfortunately, no quantitative information is available concerning T. diversiloba control by goats.

In the 1960's and 1970's, large scale conversion of chapparal to grassland and savannah was accomplished at the UC Sierra Foothill Range Field Station in Brown's Valley. The ability of poison oak to survive the mechanical crushing and burning of previously competing varieties of woody plants and the exclusive grazing by cattle has resulted in the proliferation and establishment of large, mature and nearly pure stands of poison oak on this station. The SFRFS represents an excellent opportunity to produce quantitative information concerning the ability of goats to suppress this pest without the use of expensive, objectionable or illegal chemical herbicides.

The principal investigator has 12 years of successful experience conducting nutritional investigations with goats. This experience with goats spans fields from the biochemistry of lactation to the agroecological role of goats in small East African food production systems. This experience, together with six years as supervisor of the UCD Dairy Goat Research Facility and the resources of the Animal Science Nutrition and Nutritional Biochemistry Laboratories and the SFRFS greatly enhance the probability of this project's success. During 1990-1991, the principal investigator will be on an academic leave which focuses on nutritional toxicology and allows ample time for the establishment of this project.

Chemistry and immunology of urushiol congeners

Urushiol is a name for a family of alkyl catechols that are responsible for the painful dermatitis that results from contact between human skin and members of the plant family Anacardiaceae (ElSohly et al. 1982). The principal urushiols of poison oak consist of a catechol ring with a 17 carbon sidearm attached at the 3 position (ElSohly et al. 1982). Although this 3-n-heptadec(en)yl catechol may have 3, 2, 1 or no double bonds, the toxicity of this compound is proportional to the unsaturation of the sidearm (Johnson et al. 1972) and little, if any, saturate material is found in the plant (Billets 1976).

Poison oak dermatitis is a result of delayed hypersensitivity to the quinone form of urushiol bound to skin proteins (Dunn et

al. 1986). Subsequently, urushiol specific T-cells proliferate when challenged by pure urushiol or plant extract (Kalish et al. 1988). Urushiol specific T-cells which suppress delayed hypersensitivity also can be found in subjects exposed to Toxicodendron species (Kalish et al. 1989). This is probably related to observations that oral or topical administration of urushiol can often lead to or maintain hyposensitization in sensitive and resistant individuals, respectively (Epstein et al. 1982, Reginella et al. 1989, Marks et al. 1987). Some of the itching and other mild side effects of oral therapy might be reduced if a congener of urushiol could be found that is a more powerful toleragen than an allergen (ElSohly et al. 1986, Stumpf et al. 1986).

The tendency of ruminant lipids tend have a higher degree of saturation than that of non-ruminants is due to the biohydrogenation of unsaturated dietary fatty acids by symbiotic rumen microorganisms and the powerful reducing environment that the aerobic rumen represents. If rumen biohydrogenation results in the creation of a saturated or substituted alkyl catechol with oral toleragenic activity and this material is found in goat food products, then there might be some molecular basis for the folk wisdom that people ingesting milk from goats eating poison oak are rendered hyposensitive to contact with that plant.

A number of HPLC and GLC methods are available for the analysis and preparation of urushiol fractions (Billets et al. 1976, ElSohly et al. 1982, Du et al. 1984a, Du et al. 1984b and Wasser, SIlva and **Rodriguez** 1990). Rodriguez's procedures have the advantages of speed, specificity and are currently up and running in a collaborating laboratory. This cooperator has an international reputation as a phytochemist and has participated in other team efforts involving phytochemical contact dermatitis (Reynolds, et al. 1986).

Skin protection ointments

Orchard, et al. (1986) screened 156 different preparations and found that certain polyamine salts of linolenic acid were able to prevent dermatitis in 70% of their subjects. Epstein (1989) has demonstrated that an organo-clay preparation gave 95.3% protection against 4.75 - 0.0475 nmol of topically applied urushiol. By contrast, bentonite, kaolin and silicone only provided 29.6, 37.9 and 32.9% protection, respectively. A field test of the organo-clay preparation is clearly called for. Cooperator Epstein is an accomplished basic and clinical research dermatologist, internationally recognized as an authority on urushiol contact dermatitis.

PROCEDURES:

Poison oak control experiments

Three sites which are heavily infested in poison oak and one devoid of poison oak will be browsed by goats. The infested sites are in SFRFS pastures F1-61, SH1-21 and P1-13 (See Figures 1-4). The non-infested site will serve as a control for unanticipated long term health effects of poison oak ingestion on goats in the local environment and will be located in SC 5 near the SFRFS headquarters (See map, Figure 1). The poison oak in each plot will be assessed as to the number and height of live plants by manual measurement and canopy cover by aerial photography during the summer prior to each trial and the summer following the last Spring of the trials. Primary variables include: Days to defoliation, reduction in live plant height, number and canopy cover.

F1-61: The first site (1.28 ha) will be divided into 32 400m^2 plots and randomly assigned as 4 replications of a 2 X 2 X 2 factorial arrangement of treatments. The three factors are a) mechanically cut at ground level in previous late fall or not, b) browsed in winter (1Jan-15Mar) or not, and c) browsed 10 weeks later in Spring (16Mar-31May) or not. This arrangement of treatments will require the browsing of eight plots during each season (four mature stands and four newly resprouted stands). Two moveable, predator and goat resistant cages will be used to confine and protect bands of 7-12 adult goats during each browsing treatment. These cages will completely cover the plot under treatment and will be moved on to the next plot as soon as poison oak defoliation is completed. Cage construction materials include PVC pipe, electric fencing wire, wire netting and a solar recharged power supply. Significance of main effects and interactions represented in the following model will be tested by two-way analysis of variance:

$$\mu = C_i + W_j + S_k + CW_{ij} + WS_{jk} + CS_{ik} + CWS_{ijk} + \epsilon_{ijk}$$

C = Cut before trial
W = Winter browsed
S = Spring browsed

SH1-21 and P1-13: The infestations in these fields will be surrounded with high tensile strength New Zealand-type high voltage electric fencing to confine the goats and discourage daytime predation (about 3 ha in each enclosure). Goats will be returned to a stationary predator-proof cage at sundown to prevent night predation. Bands of 30 - 60 goats will be used to defoliate these infestations once in late Winter, again during Spring and Summer if needed. The significance of browsing in these two experimental units will be

Figure 3. Sierra Foothill Range Field Station Pasture SHL-21

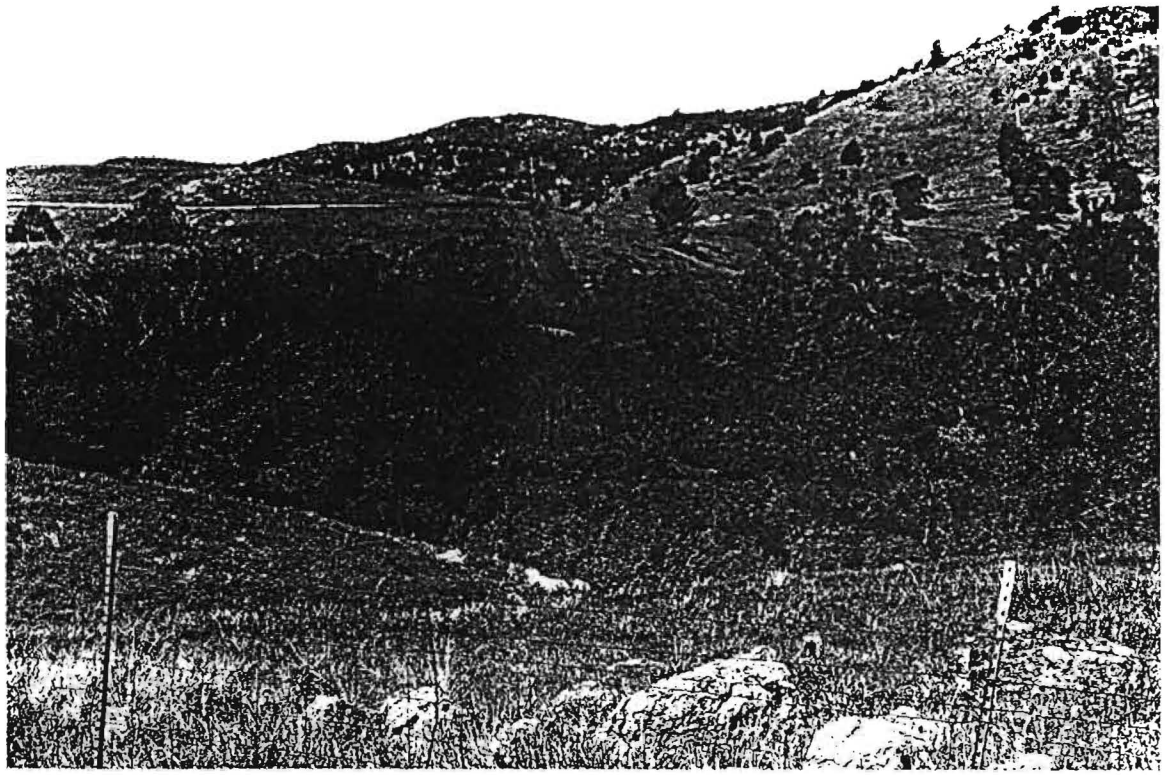


Figure 4. Sierra Foothill Range Field Station Pasture P1-13

Figure 1. Sierra Foothill Range Field Station Browns Valley, California

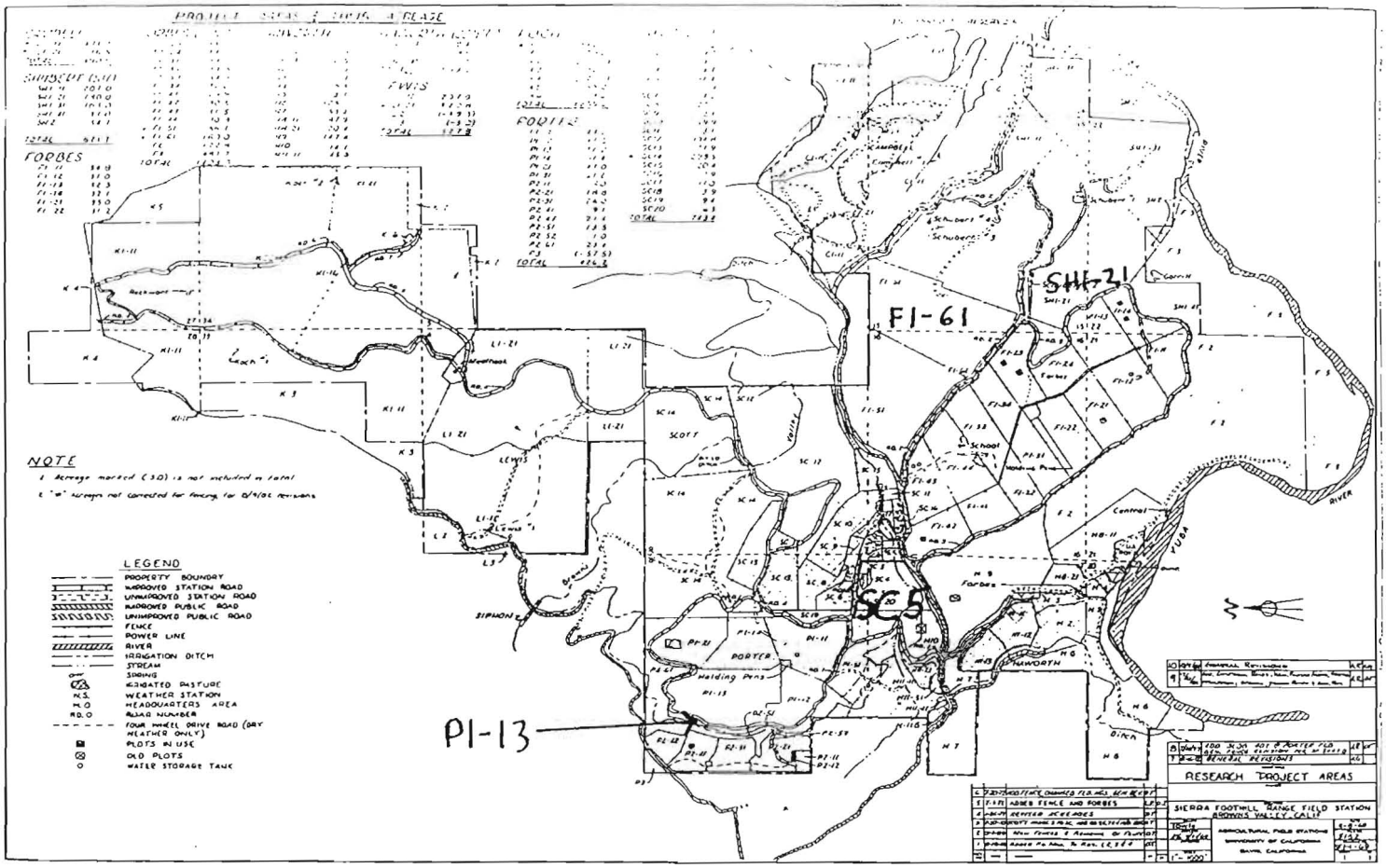
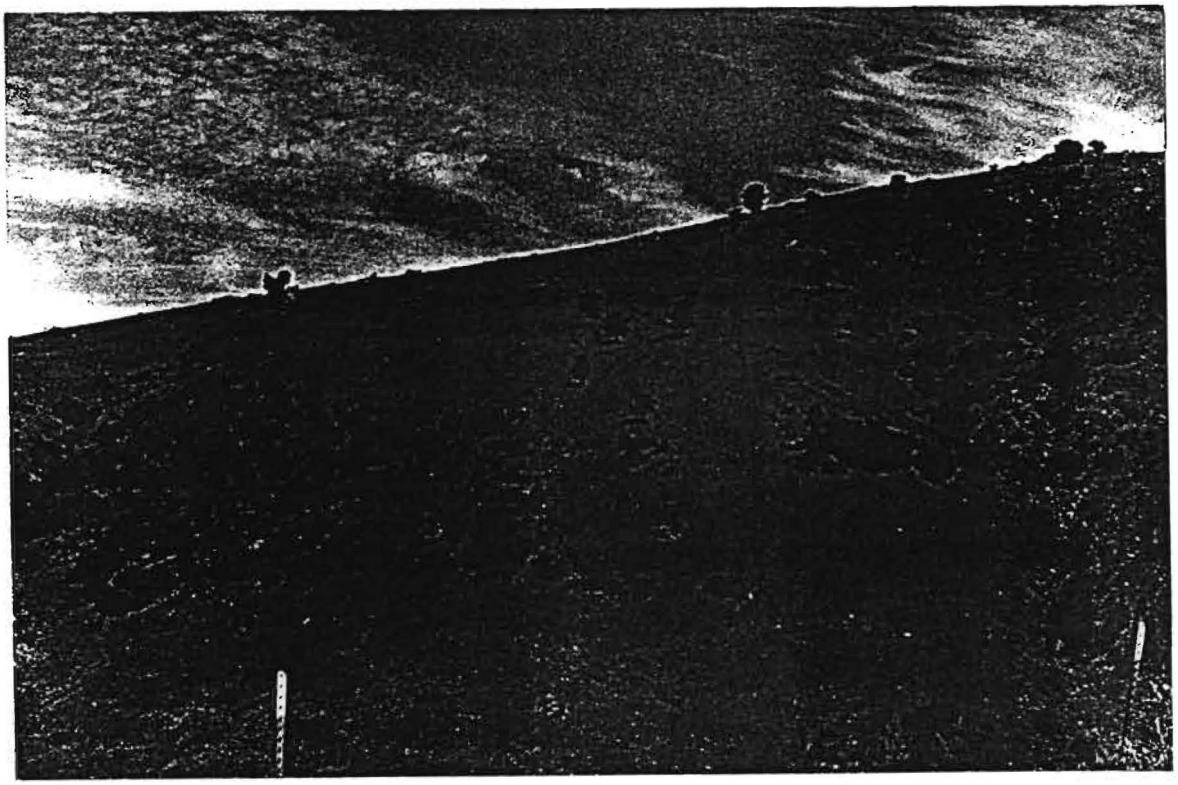


Figure 2. Sierra Foothill Range Field Station Pasture F1-61



qualitatively assessed by contrast to nearby unbrowsed stands of poison oak.

SC 5 (or other poison oak-free pasture): About 12 goats browse and graze on this 12.7 ha pasture throughout the trial. This pasture will also hold poison oak plot animals when they are not needed on the plots. All animals will be protected as in SH1-21 and P1-13 and supplemented as needed to maintain body condition (as determined by deuterium oxide dilution, Brown and Taylor 1986) and health.

Urushiol metabolism by goats

UCD preliminary survey of urushiol metabolites in goat milk: Poison oak foliage will be transported to the UCD dairy goat facility and fed free choice to six lactating French Alpine goats for one week, then replaced with a standard alfalfa/corn/cottonseed ration for the following three weeks. Foliage, milk, feces and urine samples will be taken daily from one day before until three weeks after the feeding of poison oak foliage and prepared for urushiol analysis. Acetone extracts from samples will be eluted through TSK-gelG2000HG columns with chloroform to separate urushiol components from other lipid soluble fractions (Du et al. 1984). These procedures will be carried out under N_2 to prevent oxidation of double bonds. The resulting materials will be transported to the Phytochemistry and Toxicology Laboratory at UC Irvine for analysis.

Reverse phase High Performance Liquid Chromatography and structural analysis will be used to identify and quantify urushiol components as in Wasser et al. (1990).

The concentrations of each urushiol congener will be regressed on time to describe the elimination kinetics of these potential human toxicants in goat food and waste products.

SFRFS urushiol survey: At the end of each browsing season, six goats will be slaughtered at 0, 7, 14 and 21 days after withdrawal from poison oak. The visceral fat, meat and liver will be extracted and analyzed as described above.

Skin protection trials

All participants in this project and all employees of SFRFS will be asked to participate in a double-blind field study contrasting the efficacy of Epstein's organo-clay preparation with kaolin or base cream as a poison oak blocking ointment. Those who consent to participate will be

tested for sensitivity to urushiol prior to the trial (Epstein patch test). Participants will be asked to apply their particular test ointment each time they are likely to come in contact with poison oak or urushiol. The subjects will be expected to exercise normal precautions to minimize contact with poison oak and to wash up promptly after possible exposure.

After one year of this trial, the code will be broken and the incidence of dermatitis among organo-clay recipients will be contrasted with kaolin recipients by use of X^2 analysis. The results will be revealed to the subjects who will be offered their choice of ointments for the last two years of the project. Diaries of use and efficacy will be kept on each subject during this final self-directed phase of the trial.

IMPLEMENTATION:

The public will be able to view this work from field station roadways during field days and visits by classes, producer groups and individual citizens. The oral and written comments and questions of these visitors will be recorded and included in the planning of user-friendly Cooperative Extension publications. After the first year of work, drafts of proposed control systems for homes, small farms and large ranches will be drawn up and modified during the ensuing two years of research.

Basic information concerning the metabolism of urushiol and efficacy of the organo-clays will be submitted to the Journal of Animal Science, Phytochemistry and/or Archives of Dermatology. Final results and suggestions concerning vegetation control will appear in California Agriculture, the annual Sierra Foothill Range Field Day and a new Cooperative Extension Bulletin.

Upon publication of the extension bulletins, all California television stations serving poison oak infested areas will be invited to attend a special press field day in which faculty (D. Brown) and extension personnel (both specialists and livestock advisors) will discuss and demonstrate the control system for the cameras.

The P.I. is committed to providing two annual workshops concerning this technology, one for livestock advisors and another for the general public at the SFRFS field day.

Participants in each workshop will be asked to provide photographic and quantitative written documentation of their efforts and send copies to the PI to build a central file. This file will document both the successes that validate the procedures suggested, and the failures that suggest research needed to modify this nonchemical pest management system.

RESEARCH TIMETABLE:

July - September 1990
Begin skin protection trials at SFRFS
Preliminary survey of poison oak metabolites in milk with cut poison oak at Davis.
Survey and characterize sites.
Begin construction and testing of anti-predator cages

October - December 1990
Continue skin protection trials
Build perimeter fences and anti-predator cages in final form
Manual suppression of some poison oak subplots
Buy, quarantine, process and breed goats
Submit results of urushiol metabolism studies from pen-fed goats

January - May 1991
Continue skin protection trials
Goats on the F1-61 site
Milk and meat collection

June 1991
Compile, interpret and summarize first year data
Draft first version of control systems
Modify plans for Year 2 experiments if needed

July 1991 - June 1992
Apply most useful skin protection treatment to all workers
Repeat year F1-61 trial
Begin trial at SH1-21
Modify draft control systems.
Modify plans for Year 3 experiments if needed

July 1992 - May 1993
Repeat Year F1-61 and SH1-21 trials
Begin P1-13 trial
Present preliminary results at SFRFS field day.
Summarize metabolism, skin protection and vegetation control/goat nutrition results. Submit for publication.
Publish a final set of control systems in California Agriculture.
Prepare a Cooperative Extension Bulletin on biological control of poison oak.

Budget:

	% of time on project	First Year (90-1)	Second Year (91-2)	Third Year (92-3)
Personnel				
Graduate RAship	50	11,862	12,419	13,040
Student assistant	50	5300	5500	5700
Benefits (2.14% of salary + RA health insurance)		607	671	689
Supplies & expenses				
Goats ($50 each)		1200	3000	3000
Cages		3000	1500	1500
Feed supplement		750	2520	4320
Electric Fencing		500	1000	1000
HPLC rev. phas. columns		1000	1000	0
HPLC eluents		500	500	500
Animal vaccines, medicine.		100	300	500
Sample containers		200	200	200
Extract. solvents		150	250	250
Aerial photos		400	200	200
Publication costs		350	350	750
Overnight at bunkhouse ($9/person/night)		900	900	900
Permanent equipment		0	0	0
Travel				
UCD team to SFRS (13/year) (150 mi/trip, $.28/mi)		546	546	546
UCI team to UCD (1/year 2) (960 mi/trip, $.28/mi)		0	269	0
UCSF team to SFRS (2/year) (270 mi/trip, $.28/mi)		151	151	151
UCD team to UCI (1/year 1) (960 mi/trip, $.28/mi)		269	0	0
Total		27,785	31,276	33,246

Roles of participants:

Dan Brown - Principal investigator (.25 FTE)
1) Plan and coordinate all components of this project.
2) Design and construct laboratory and field equipment.
3) Compile, analyze and interpret data.
4) Lead author of publications regarding vegetation control, goat nutrition and complete control system with collaborators, staff and graduate students as co-authors.
5) Continued support of sytem use by advisors and producers

William Epstein - Major Collaborator (.10 FTE)
1) Conduct urushiol sensitivity tests
2) Provide coded poison oak block ointments.
3) Break code and interpret skin protection results.
4) Lead author of relevant publication with co-authors Brown and Daley

Eloy Rodriguez - Major Collaborator (.10 FTE)
1) Analyze milk meat and vegetation for urushiol and related compounds
2) Teach Brown, Taylor and graduate students urushiol analysis
3) Lead author of relevant publications with co-authors Brown, Taylor and grad students

Scott Taylor - Animal Science Department Staff Research Associate, UCD (.25 FTE)
1) Conduct nutrient analysis of vegetation
2) Conduct D2O analysis of goat blood
3) Establish independent urushiol analysis capabilities at UCD
4) Co-author several papers

Cindy Daley - Animal Science Department Staff Research Associate, SFRFS (.25 FTE)
1) Construct and maintain equipment and direct day-to-day supervision of all experiments at SFRFS
2) Collect samples and compile field data
3) Help author and edit publications

Station Personnel - Animal Technicians
1) Move, treat animals and equipment as directed by Daley.
2) Mechanically or manually clear poison oak from selected plots.

Graduate student - 0.5 FTE Research Assistant
1) Conduct UCD urushiol trial
2) Collect samples and data at SFRFS
3) Design own, related experiments suggested by early results
4) Co-author articles

Student assistants - 20h/wk
1) Milk and feed goats during urushiol metabolism trials
2) Help clear and maintain plots

Literature Cited

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urushiol triggered suppressor T-cells. Journal of Investigative Dermatology 92(1):46-52.

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Nastis, A.S. and J.C. Malechek. 1981. Digestion and utilization of nutrients in oak browse by goats. Journal of Animal Science 53:283-290.

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Reynolds, G.W., W.L. Epstein and E. Rodriguez. 1986. Unusual contact allergens from plants in the family Hydrophyllaceae. Contact Dermatitis 14(1):39-44.

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Sidahmed, A.E., S.R. Radosevich, J.G. Morris and L.J. Koong. 1982. Nutritive value of chapparal for goats grazing in fuel breaks. California Agriculture May-June 1982:12-14.

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Vietmeyer, N. 1986. Science has got its hands on poison-ivy, poison-oak and poison sumac. Fire management notes (USDA Forestry) 47:23-28.

Wasser, C.F., F. Silva and E. Rodriguez. 1990. Urushiol components and mediators in DNA strand scission. Experentia. In press.

Dan Lawrence Brown

Department of Animal Science
University of California
Davis, California 95616

(916)752-7184 office
(916)758-9736 home

EDUCATION:

Cornell University	Animal Nutrition PhD. 1981
University of California	Agricultural Ed. Cert. 1977
University of California	Animal Science B.S. 1976

EMPLOYMENT AND FELLOWSHIPS:

Assistant Professor and Nutritionist	University of California Davis, CA 1983-present
Animal Scientist	Winrock International 1981-1983 Maseno, Kenya
Liberty Hyde Bailey Graduate Research Assistant	Cornell University 1977-1981 Ithaca, NY

PROFESSIONAL SOCIETIES: ADSA, ASAS, AAAS

AREAS OF RESEARCH AND EXTENSION SPECIALIZATION:

Control of body nutrient reserves.

Factors limiting meat and milk production from byproduct feeds, tropical forages and **limited resource production systems.**

MOST RECENT TEACHING:

Spring 1989: Animal Science 114 (Dairy Cattle Production) Taught the nutrition lectures and laboratory sections of this senior dairy course.

Fall 1989: Animal Science 1 (Domestic Animals and People) Introductory course for Animal Science students and a General Education course for students in the social sciences and humanities. Three hours of lecture and 16 sections of 3-hour laboratory sections each week. Enrollment 308.

Winter 1990: Nutrition 115 - Animal Feeds and Nutrition - Upper division course for Animal Science and allied majors. Includes 3 hours of lecture and five 3-hour wet lab sections per week. Large animal trials and feed analyses included. Enrollment varies from 60 - 100.

Dan Lawrence Brown
10 most relevant refereed publications

Brown, D.L. and D.E. Hogue. 1985. Effects of feeding monensin sodium to lactating goats: Milk composition and ruminal volatile fatty acids. J. Dairy Sci. 68: 1141-1147.

Brown, D.L. and E. Chavalimu. 1985. Effects of ensiling or drying on five forage species in western Kenya. Animal Feed Science and Technology 13(1985): 1-6.

Brown, D.L. and S.J. Taylor. 1986. Deuterium oxide dilution kinetics to predict body composition in dairy goats. J. Dairy Sci. 69: 1151-1155.

Brown, D. L. and D. E. Hogue. 1987. Effects of feeding monensin to lactating goats: Acetyl CoA carboxylase, hormone sensitive lipase, plasma glucose, and circulating hormones. J. Dairy Sci. 70:823.

Brown, D. L., D. M. Barnes and C. C. Calvert. 1987. Delayed excretion of 3-methyl histidine in goats. J. Nutr. 117:2106-2108.

D. L. Brown and D. M. Harris. 1988. Effects of caffeine and 3-isobutyl 1-methyl xanthine on caprine milk secretion. J. Dairy Sci. 71:513-517.

B. A. Reed and D. L. Brown. 1988. Almond hulls in diets for lactating goats: Effects on milk yield and composition, feed intake and digestibility. J. Dairy Sci. 71:530.

Brown, D.L., M.K. Salim, E. Chavalimu and H.A. Fitzhugh. 1988. Intake, selection, apparent digestibility and chemical composition of Pennisetum purpureum and Cajanus cajan foliage as utilized by lactating goats in Kenya. Small Ruminant Research. 1:59-65.

Brown, D.L., S.R. Morrison and G.E. Bradford. 1988. Effect of temperature on milk production of Nubian and Alpine Goats. J. Dairy Sci. 71:2486-2490.

Barnes, D. M. and D. L. Brown. 1990. Protein reserves in lactating dairy goats. Small Ruminant Research. 3:19-24.

UNIVERSITY OF CALIFORNIA, IRVINE

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PROF. ELOY RODRIGUEZ
PHYTOCHEMICAL & TOXICOLOGY LABORATORY
DEPARTMENT OF DEVELOPMENTAL AND CELL BIOLOGY
(714) 856-6105 / 856-6499

IRVINE, CALIFORNIA 92717

April 26, 1990

Dan Brown
Animal Science
University of California
Davis, CA 95616

Dear Dr. Brown,

The Phytochemical and Toxicology Laboratory at UC Irvine will be glad to assist you in the isolation and structural elucidation of the urushiols and other metabolites present in the plant and/or mild products. My laboratory has considerable experience in the study of poison oak and other plants that cause allergic contact dermatitis. If we can be of any further assistance, please let us know.

Sincerely yours,

Eloy Rodriguez

Eloy Rodriguez
Professor

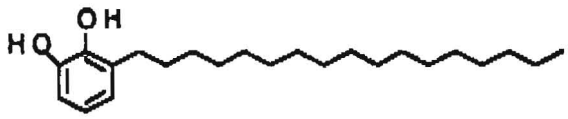
ER/kk

HPLC ANALYSIS OF URUSHIOL IN POISON OAK

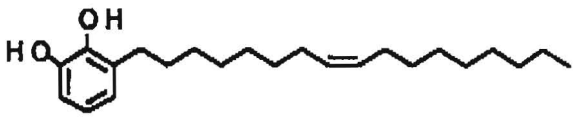
Christian WASSER[a], Barbara GARTNER[b], Eloy RODRIGUEZ[a]

[a] Phytochemistry and Toxicology Laboratory
Department of Developmental and Cell Biology
University of Califonia Irvine
IRVINE, CA 92717
[b] Department of Biological Sciences
Stanford University
STANFORD, CA 94305

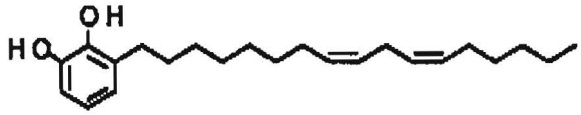
CATECHOLS PRESENT IN POISON OAK URUSHIOL [1] :



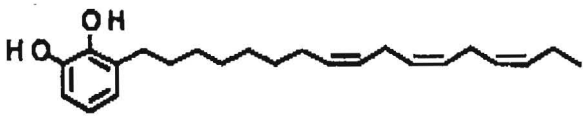
3-heptadecylcatechol
1



3-heptadecenylcatechol
2



3-heptadecadienylcatechol
3



3-heptadecatrienylcatechol
4

MATERIAL AND METHOD.

Preparation of extracts :

Poison oak leaves (2.0 g) were extracted with 30 ml of methanol. The extracts were then centrifuged for 5 mn at 3000 rpm. 5 ml of the supernatant was evaporated to dryness. After addition of 5 ml of dichloromethane the resulting mixture was filtered and the clear solution evaporated. The residue of the evaporation was redissolved in 5 ml of HPLC grade methanol. Each sample was then filtered through a Miniclean® Cartridge (C18, Altech) before injection on the HPLC column.

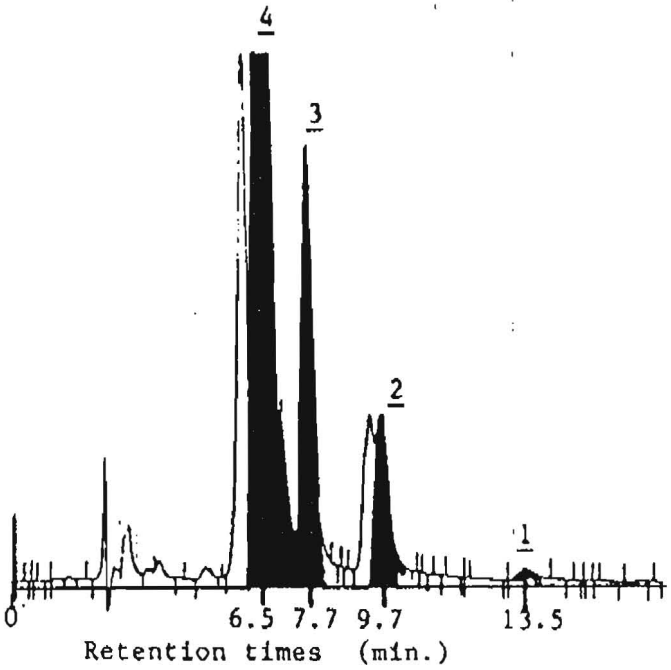
HPLC conditions [2] :

HPLC analysis was performed using a C18 reversed phase column (Alltech, Econosphere® C18, 250 x 4.6 mm, 5 µm particle size) and MeOH-water (95:5) mixture at 1.2 ml/mn with UV detection at 275 nm. The total amount of urushiol contained in each sample was determined by comparison with a set of external standards of purified urushiol.

Calibration :

Four standard solution of purified poison oak urushiol are analyzed. Concentration used are (Weight/volume) : 0.1%, 0.05%, 0.02% and 0.01%. The detector response is linear in that range.

Typical Chromatogram (standard solution of purified urushiol : 0.5 mg/ml)



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1 Corbett M.D., Billets S.,
J. Pharm. Sci. (1976) *64* : 1715.

2 ElSohly M.A., Adawadkar P.D., Ma C.-Y., Turner C.E.,
J. Nat. Prod., (1982) *45* : 532.

FF PRINCIPAL INVESTIGATOR/PROGRAM DIRECTOR: Eloy Rodriguez

BIOGRAPHICAL SKETCH

Give the following information for the key personnel and consultants listed on page 2. Begin with the Principal Investigator/Program Director. Photocopy this page for each person

NAME	POSITION TITLE	BIRTHDATE (Mo., Day, Yr.)
Eloy Rodriguez	Professor	01/07/47

EDUCATION (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)

INSTITUTION AND LOCATION	DEGREE	YEAR CONFERRED	FIELD OF STUDY
University of Texas, Austin	B.A.	1969	Zoology
University of Texas, Austin	Ph.D.	1975	Phytochemistry
University of British Columbia, Vancouver	(Medical Postdoc)	1975-76	Medicinal Phytochemistry

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experie and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles and c plete references to all publications during the past three years and to representative earlier publications pertinent to this application. DO N EXCEED TWO PAGES

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Employment:

Assistant Professor, University of California, Irvine, (1976-1979). Associate Professor, University of California, Irvine, (1979-1983). Professor, University of California, Irvine, School of Biological Sciences and College of Medicine, (1983-present). Visiting Professor and Research Scientist, University of San Francisco, Department of Pharmaceutical Chemistry, (1984-1985). Visiting Professor, Medical Microbiology, School of Medicine, University of British Columbia, (1988).

Experience:

Member of the Bio-organic and Natural Products Chemistry Study Section, NIH (1983-1987). Member, Environmental Toxicology Program (NIEHS), College of Medicine, UCI (1984-present).

Honors:

Senior Fulbright Scholar (1978). Nominee for the A.T. Waterman Outstanding Young Scientist Award - NSF (1983). Indo-American and Fulbright Senior Scholar Award (1983). Rosser-Rivera Award 1985 - outstanding research in Biological Chemistry (UCR/CSLA). Research Career Development Awardee, NIAID-NIH, (1982-1987).

Articles Published: 125 and 1 Book

Publications Pertinent to this Application (1985-90)

Rodriguez, E., M. Aregullin, T. Nishida, S. Uehara, R. Wrangham, Z. Abramowski, A. Finlayson and G. H. N. Towers. 1985. Thiarubrine A, a Bioactive Constituent of Aspilia (Asteraceae) Consumed by Wild Chimpanzees. Experientia 41: 419-420.

Rodriguez, E. 1985. Insect Feeding deterrents from Semi-arid and Arid Land Plants. In Bioregulators for Pest Control (P.A. Hedin, ed.). American Chemical Symposium Series, Washington, D. C. 276: 447-453.

Proksch, P. and E. Rodriguez. 1985. Baja California: Ein Modell fur Chemookologische Adaptationen von Wustenpflanzen. Biologia in Unserer Zeit 3: 75-80 (German).

Downum, K. R., D. J. Keil and E. Rodriguez. 1985. Distribution of Acetylenic Thiophenes in the Pectidinae. Biochemical Systematics and Ecology 13: 109-113.

Aregullin, M. and E. Rodriguez. 1987. Phytochemical Studies of the Genus Flourensia from the Chihuahuan Desert. In Second Symposium on Resources of the Chihuahuan Desert Region, U. S. and Mexico (A. M. Powell, ed.). Chihuahuan Desert Research Institute, Alpine, Texas. No. 5, January 1987.

Cavin, J. C., S. M. Krassner and E. Rodriguez. 1987. Plant-Derived Alkaloids Active Against Trypanosoma cruzi. J. of Ethnopharmacology 19: 89-94.

Cavin, J. C., and E. Rodriguez. 1988. The Influence of Dietary B-Carboline Alkaloids on Growth Rate, Food Consumption and Food Utilization of Spodoptera exigua (Gubner). J. Chemical Ecology 14: 475-484.

Cosio, E. G., G. H. N. Towers, R. A. Norton and E. Rodriguez. 1988. Polyacetylenes. In Cell Culture and Somatic Cell Genetics of Plants, Vol. 5. Academic Press, Inc., New York (pp. 495-508).

Rodriguez, E. 1988. Dithiopolyacetylenes as Potential Pesticides. In Biologically Active Natural Products: Potential Use in Agriculture (H. G. Cutter, ed.). American Chemical Symposium Series, Washington, D. C. No. 380 (432-437).

Downum, K. R., S. Villegas, E. Rodriguez and D. J. Keil. 1989. Plant Photosensitizers: A Survey of Their Occurance in Arid and Semi-arid Plants from North America. J. of Chemical Ecology 15: 345-355.

Freeman, F., D. S. H. L. Kim and E. Rodriguez. 1988. The Chemistry of 1,2-Dithiins. Sulfur Report. (In press).

Martinez, M., G. Flores, L. Rodriguez-Hahn, and E. Rodriguez. 1988. Sesquiterpenoids from Mortonia scabrella (Celastraceae). Spectroscopy: An International Journal. (In press).

Paiz, L., I. Lopez, J. West and E. Rodriguez. 1989. Ditiopoliinos Bioactivos de Especies de Aspilia, Rudbeckia, y Ambrosia (Asteraceae). Revista Latina Americana de Quimica. 20: 65-67.

Tsai, B. Y., J. West, S. D. van Gundy and E. Rodriguez. 1989. Screening Plants for Nematicidal Agents. In Phytochemical Pesticides, Vol. II (I. Kudo and M. Jacobson, eds.). CRC Press.

Balza, F., I. Lopez, Z. Abramowski, E. Rodriguez and G. H. N. Towers. 1989. New Dithiacyclohexadienes and Thiophenes from Ambrosia Chamissonis. Phytochemistry 28: 3523-3524.

West, J., B. Y. Tsai, S. D. van Gundy and E. Rodriguez. 1990. Chemical Aspects of Root-Nematode Interactions. In American Society Proceeding (in press).

PRINCIPAL INVESTIGATOR/PROGRAM DIRECTOR: Rodriguez, Eloy

OTHER SUPPORT

(Use continuation pages if necessary)

FOLLOW INSTRUCTIONS CAREFULLY. Incomplete, inaccurate, or ambiguous information about OTHER SUPPORT could lead to delays the review of the application. If there are changes subsequent to submission, notify the executive secretary of the initial review group.

For each of the key personnel named on page 2, list, in three separate groups: (1) *all* currently active support; (2) *all* applications and proposa pending review or funding; and (3) applications and proposals planned or being prepared for submission. Include *all* Federal, non-Feder and institutional research, training, and other grant, contract, and fellowship support at the applicant organization and elsewhere. If part a larger project, identify the principal investigator/program director and provide the data for both the parent project and the subproject. none, state "none."

For each item give: (a) the source of support, identifying number and title; (b) percentage of appointment on the project; (c) dates of enti project period; (d) annual direct costs; (e) a brief description of the project; (f) whether the item overlaps, duplicates, or is being replac or supplemented by the present application; delineate and justify the nature and extent of any scientific and/or budgetary overlaps or bour aries; and (g) any modifications that will be made should the present application be funded.

PRINCIPAL INVESTIGATOR/PROGRAM DIRECTOR:

(1) CURRENTLY ACTIVE SUPPORT: (a)

(1) Currently Active Support:

E. Slosson Fund (University of California)
Nematicidal Agents from Plants (03/01/88 - 02/28/90) $40,000 (direct costs)

NIH - AI 18398. "Dermatochemistry of Allergens and Photosensitizers"
(1990 - 1991) - $162,516

NIH - "Chemical Studies of Novel Sulfur Containing Antibiotics"
(1990 - 1993) - $217,091

CURRICULUM VITAE

ELOY RODRIGUEZ
Department of Developmental
and Cell Biology
and College of Medicine
University of California
Irvine, California 92717
(714) 856-6105

Dr. Eloy Rodriguez is a Professor of Cell Biology and Toxicology in the School of Biological Sciences and College of Medicine at the University of California, Irvine. His research focuses on the cell biology, chemistry and toxicology of biologically active and phototoxic natural chemicals. The research is supported by the National Institutes of Health, National Institute of Environmental Health Sciences and the National Science Foundation.

Professor Rodriguez has presented numerous symposia lectures in the United States and many foreign countries on dermatotoxicology and molecular mechanisms of natural chemicals which exhibit pesticidal or medicinal activity. Foreign countries where he has lectured include the People's Republic of China, Canada, India, Australia, Mexico, Columbia, Norway, Sweden, Thailand, Africa, Germany, France, England, Switzerland and South America. He has also given lectures to public and secondary schools on science and the importance of higher education for minorities.

Professor Rodriguez is currently the Faculty Assistant for International Affairs in Academic Affairs, Director of the Howard Hughes Biomedical Institute Research and Training Program for Undergraduates in the Biological Sciences and Director of the NCCHE Science Fellowship Program for Chicanos/Hispanic Undergraduates. He is also Vice President of the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) and a Council Delegate of Biological Sciences for the American Association for

the Advancement of Science (AAAS). He is an active member of the American Chemical Society, American Pharmacognosy Society and the International Society for Chemical Ecology.

Professor Rodriguez has been the recipient of several awards, including the National Institutes of Health Research Career Development Award from 1982-87 and the University of California, Riverside-California State University, Los Angeles Rosser-Rivera Award in 1985 for outstanding research in the area of Biological Chemistry. In 1988, he was chosen as one of the 100 most Influential Hispanics in the Nation. In 1989, he was selected by the Los Angeles Times to receive the "89 for 89" Award which recognizes individuals from Southern California for their professional achievements.

Dr. Rodriguez received his Ph.D. in 1975 from the University of Texas at Austin. He was a Medical Postdoctoral Fellow in Plant Toxicology and Dermatology at the University of British Columbia from 1975 to 1976. He was honored as a Fulbright Senior Scholar in 1978 and an Indo-American-NSF Senior Scholar in 1983. He was a visiting Professor and Research Scientist in the Department of Pharmaceutical Chemistry, University of California, San Francisco from 1984 to 1985. Professor Rodriguez has authored or co-authored more than 120 scientific articles and co-edited the book entitled Biology and Chemistry of Plant Trichomes.

REPRESENTATIVE PUBLICATIONS

1. Subba Rao, P.V., A. Mangala, G.H. Towers and E. Rodriguez. 1978. Immunological Activity of Parthenin and Its Diasteriomer in Persons Sensitized by *Parthenium hysterophorus* L. Contact Dermatitis 4:199-203.

2. Rodriguez, E., G.W. Reynolds and J.A. Thompson. 1981. Potent Contact Allergen in the Rubber Plant Guayule (*Parthenium argentatum*). Science 211: 1365-1366.

3. Rodriguez, E., J.C. Cavin and J.E. West. 1982. The Possibile Role of Amazonian Psychoactive Plants in the Chemotherapy of Parasitic Worms - A Hypothesis. J. of Ethnopharmcology 6:303-309.

4. Reynolds, G.W., P. Proksch and E. Rodriguez. 1985. Prenylated Phenolics That Cause Contact Dermatitis for Glandular Thrichomes of *Turricular parryi*. Planta Medica 6:494-498.

REPRESENTATIVE PUBLICATIONS

5. Norton, R.A., D.N. Radin and E. Rodriguez. 1986. Rubber Synthesis in Crown Gall and Normal Tissue Cultures of Guayule. In Guayule, a Natural Rubber Resource (D.D. Fangmeier and S.M. Acorn, eds.). Tucson, Arizona. December, 1986 (pp.43-50).

6. Cavin, J.C., S.M. Krassner and E. Rodriguez. 1987. Plant Derived Alkaloids Active Aganist *Trypanosoma cruzi*. J. of Ethnopharmocology 19:89-94.

7. Tsai, B.Y., J. West, S.D. van Gundy and E. Rodriguez. 1988. Screening Plants for Nematicidal Agents. In Phytochemical Pesticides, Vol. II (I. Kudo and M. Jacobson, eds.). CRC Press (In press).

8. Cosio, E.G., G.H.N. Towers, R.A. Norton and E. Rodriguez. 1988. Polyacetylenes. In Cell Culture and Somatic Cell Genetics of Plants, Vol. 5. Academic Press, Inc., New York (pp. 495-508).

9. Wasser, C., F. Silva and E. Rodriguez. 1990. Urushiol Components as Mediators in DNA Strand Scission. Experientia.