Reprinted with permission from: Leafy Spurge Symposium Proceedings. Bozeman, MT. A trip to Whitehall, Montana to view field research on Tuesday afternoon, June 22, 1982.

Published by: Great Plains Agricultural Council.

Field trip manual – Leafy spurge symposium Ray Gillespie Ranch, Whitehall Montana

(*Article available at on the following pages)

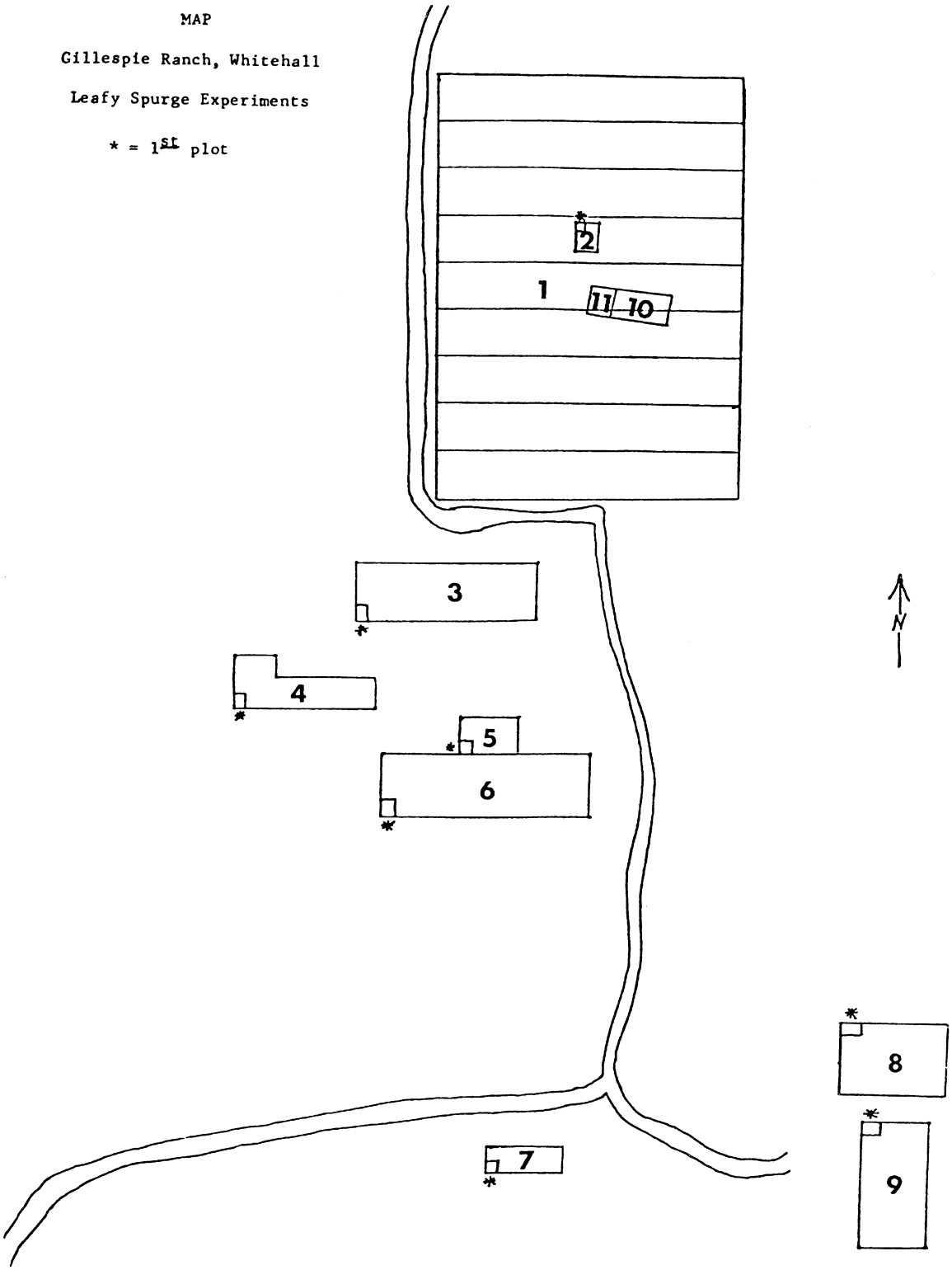
TABLE OF CONTENTS

MAP

Gillespie Ranch, Whitehall

Leafy Spurge Experiments

* = 1st plot



The Forage Value of Leafy Spurge for Ewes and Lambs

Sue Bartz, M.S. Graduate Research Assistant
Eldon Ayers, Research Associate
K. M. Havstad, Assistant Professor

Department of Animal & Range Sciences,
Montana State University

A recently completed study (a cooperative effort between MSU's Plant & Soil Science and Animal & Range Sciences Departments) quantified the consumption of leafy spurge by ewes grazing summer rangeland in central Montana. In general, this previous study indicated that ewes, following a period of adjustment, would consume 40 to 50% of their diets as leafy spurge. These consumption levels were irrespective of the degree to which leafy spurge had infested these summer grazed rangelands.

Following this data analysis, an additional study was designed to further examine the nutritional value of this noxious species as a forage for both ewes and lambs. On a cooperative basis with the Montana Agricultural Experiment Station and Ray Gillespie, Whitehall, MT, 45 ewe/lamb pairs have been placed on summer rangeland infested with leafy spurge. Nine 4½ acre pastures have been divided into three treatments. These treatments are: 1) leafy spurge controlled with chemicals, 2) light levels of leafy spurge infestations (about 10% of the plant composition), and 3) heavy levels of leafy spurge infestations (about 20% or more of the plant composition).

Lamb weight gains will be monitored throughout the summer grazing season. Additionally, the ewes will be used to collect data on quantity of forage intake and quality of the diet selected by these animals on the three treatments. From this information, an analysis will be presented on the value of this range plant for the grazing sheep. This study will be continued through 1983.

EXPERIMENT NO.: 82101001

TITLE: Effect of pulling on leafy spurge regrowth. Gillespie Ranch, Whitehall.

Crop Information

Crop	pasture	Seeding depth	
Planted		Row width	
Experimental design	RCB	Seeding rate	
Replications	3	Plot size	7 x 15'

Crop Stage

Weeds Present	Stage of Growth	Population Density
Leafy Spurge	2-6" pre bud	1-9 plts/ft^2

PURPOSE: Very little force is needed to pull leafy spurge plants from soil. Approximately 1 to 5 inches of root system are removed with pulling which produces a great deal of root damage.

We are constructing a machine to pull leafy spurge. This experiment is designed to measure the regrowth potential of spurge which will be hand-pulled at several dates during the season.

Experiment No.: 82101001 Map No.: 4

Title: Effect of Pulling on Leafy Spurge Regrowth

Notes: Plot Size = 7 ft. x 15 ft.

Treatment No.	Date of Pulling	Plot Number		
		Rep I	Rep II	Rep III
1	5/11/82	101	204	308
2	6/1/82	102	205	303
3	6/17/82	103	206	301
4		108	207	306
5		105	203	302
6	Check	106	201	305
7		107	208	304
8		104	202	307

EXPERIMENT NO.: 82101003

TITLE: Effect of rate of application of Glyphosate for Leafy Spurge control, Gillespie Ranch, Whitehall.

Crop Information

Crop	pasture	Seeding depth	
Planted		Row width	
Experimental design	RCB	Seeding rate	
Replications	3	Plot size	7 x 20'

Herbicide Application

Sprayer	Backpack Date 5/11/82	Pressure	30 Volume 13 gpa
Propellent	CO_2	Nozzles	8002
Time	2:00 p.m.	Rel. humidity	47%
Wind:	0-2 mph	Air temperature	52°F
	NE direction	Soil temp.:	2" 50°F 4" 44°F

Crop Stage

Weeds Present	Stage of Growth	Population Density
Leafy Spurge	2-7" pre bud	1-7 plts/ft^2

PURPOSE: It has been reported that low rates of glyphosate stimulated uncontrolled root bud initiation in spurge. We will measure regrowth by counting stems per square meter after application of glyphosate.

Experiment No.: 82101003 Map No.: 5

Title: Effect of Rate of Glyphosate Application for Leafy Spurge Control.

Notes: Plots = 7ft. x 20 ft.

Treatment No.	Rate lb/A	Plot Number		
		Rep I	Rep II	Rep III
1	1/8	101	207	302
2	1/4	102	206	304
3	1/2	103	204	307
4	1	107	201	306
5	2	105	203	305
6	4	106	205	301
7	check	104	202	303

EXPERIMENT NO.: 82101004

TITLE: Control of Leafy Spurge with SULV and 2,4-D amine at several application dates, Gillespie Ranch, Whitehall.

Crop Information

Crop pasture
Planted
Experimental design RCB
Replications 3
Seeding depth
Row width
Seeding rate
Plot size 7 x 20'

Herbicide Application

Sprayer Backpack Date 5/11/82
Propellent CO_2
Time 1:00 p.m.
Wind: 0-2 mph
NE direction
Pressure 30 Volume 13 gpa
Nozzles 8002
Rel. humidity 47%
Air temperature 52°F
Soil temp.: 2" 50°F 4" 44°F

Crop Stage

Weeds Present	Stage of Growth	Population Density
Leafy Spurge	2-7" pre bud	1-8 plts/ft^2

PURPOSE: 'Ded-Weed SULV' is a 2,4-D amine formulation sold by the Thompson-Hayward Chemical Company. It is being promoted as the "Poor Man's Roundup" by several dealers in the state. We are trying to determine if SULV is more effective than conventional amine formulations. We will measure regrowth this year and next year.

Experiment No.: 82101004 Map No.: 6

Title: Control of Leafy Spurge With SULV and 2,4-D Amine at Different Application Times.

Notes: Plot size: 7 ft. x 20 ft.

Treatment No.	Herbicide	Rate lb/A	Timing	Plot Number Rep I	Rep II	Rep III
1	SULV	.5	Early Spring	101	223	310
2	SULV	1.0	Early Spring	102	209	315
3	SULV	2.0	Early Spring	103	204	307
4	2,4-D Amine	.5	Early Spring	104	214	313
5	2,4-D Amine	1.0	Early Spring	105	205	317
6	2,4-D Amine	2.0	Early Spring	106	202	321
7	SULV	.5	Early June	107	218	311
8	SULV	1.0	Early June	108	224	304
9	SULV	2.0	Early June	109	225	312
10	2,4-D Amine	.5	Early June	110	208	306
11	2,4-D Amine	1.0	Early June	125	201	325
12	2,4-D Amine	2.0	Early June	112	222	318
13	SULV	.5	Early July	113	219	301

Experiment No.: 82101004

Treatment No.	Herbicide	Rate lb/A	Timing	Plot Number Rep I	Rep II	Rep III
14	SULV	1.0	Early July	114	212	323
15	SULV	2.0	Early July	115	216	320
16	2,4-D Amine	.5	Early July	116	203	302
17	2,4-D Amine	1.0	Early July	117	210	305
18	2,4-D Amine	2.0	Early July	118	211	314
19	SULV	.5	Early August	119	215	303
20	SULV	1.0	Early August	120	217	319
21	SULV	2.0	Early August	121	206	324
22	2,4-D Amine	.5	Early August	122	220	316
23	2,4-D Amine	1.0	Early August	123	213	309
24	2,4-D Amine	2,0	Early August	124	207	322
25	Check			111	221	305

EXPERIMENT NO.: 82101005

TITLE: The effect of shocking on Leafy Spurge regrowth.

Crop Information

Crop	pasture	Seeding depth	
Planted		Row width	
Experimental design	RCB	Seeding rate	
Replications	3	Plot size	3 x 6'

Herbicide Application

Sprayer	Date 5/7/82	Pressure	Volume
Propellent		Nozzles	
Time		Rel. humidity	
Wind:	mph	Air temperature	
	direction	Soil temp.: 2"	4"

Crop Stage

Weeds Present	Stage of Growth	Population Density
Leafy Spurge	2-6" pre bud	1-8 plts/ft^2

Purpose: The cell walls of Leafy Spurge laticifers dissolve soon after differentiation so continuous tubes of latex occur near the vasular tissue.

We wanted to determine if latex was an efficient conductor of electricity which would make electric shocking an effective means of control. Latex is a fairly efficient conductor of electricity.

Soil grounded any charge we applied to the plant.

Experiment No.: 82101005 Map No.: 7

Title: The Effect of Shocking on Leafy Spurge Regrowth

Notes: Plot size = 3 ft x 6 ft

First 4 treatments - the electrodes were touched to top of plants.
Second 4 treatments - the electrodes were touched to ground on 2 sides of the plant.

Treatment No.	Voltage	Timing	Plot Number Rep I	Rep II	Rep III
1	1000	Early May	101	204	308
2	3000	Early May	102	209	303
3	5000	Early May	103	206	301
4	7000	Early May	108	207	306
5	Check		105	203	309
6	1000	Late May	106	201	305
7	3000	Late May	107	208	304
8	5000	Late May	104	202	307
9	7000	Late May	109	205	302

EXPERIMENT NO.: 82101006

TITLE: Hydrocarbon study

Crop Information

Crop	pasture	Seeding depth	
Planted		Row width	
Experimental design	RCB	Seeding rate	
Replications	3	Plot size	15 x 30'

Soil Information

Fertilizer used	380# P_2O_5	Previous crop	
	150# 34-0-0		

Herbicide Application

Sprayer	Backpack Date 5/5/82	Pressure	40 Volume 19 gpa
Propellent	CO_2	Nozzles	8002
Time	4:00 p.m.	Rel. humidity	46%
Wind:	5-10 mph	Air temperature	55°F
	SW direction	Soil temp.:	2" 54°F 4" 50°F

PURPOSE: We are producing pure spurge which we have fertilized and will irrigate. We will compare 1 versus 2 cuttings and measure hydrocarbon production per acre. Preliminary results indicate that spurge contains very little hydrocarbons.

Experiment No.: 82101006 Map No.: 8

Title: Hydrocarbon Study

Notes: Plots = 15 ft. x 30 ft.

Fertilizer Applications: P_2O_5: 80#/A, 10/29/81
34-0-0 150#/A, 4/27/82

Treatment No.	Treatment	Plot Number Rep I	Rep II	Rep III
1	Non Irr. Fert.	101	202	301
2	Non Irr. Non-Fert.	102	201	302
3	Irr. Fert.	103	204	303
4	Irr. Non-Fert.	104	203	304

EXPERIMENT NO.: 81101004

TITLE: Fertilizer effect on grass growth and herbicide activity on Leafy Spurge, Gillespie Ranch, Whitehall.

Crop Information

Crop: pasture
Planted:
Experimental design: RCB
Replications: 3
Seeding depth:
Row width:
Seeding rate:
Plot size: 7 x 20'
Sod seed plots: 8 x 20'

Soil Information

Soil type:
O.M.: pH:
Previous crop:
Fertilizer used: 0-45-0 380#/A

Herbicide Application: Trt. 4,5

Sprayer: Backpack Date: 10/29/81
Propellent: CO_2
Time: 3:00 p.m.
Wind: 0 mph
direction
Pressure: 30 Volume: 29 gpa
Nozzles: 8003
Rel. humidity:
Air temperature: 50°F
Soil temp.: 2" 4"

Crop Stage

Weeds Present	Stage of Growth	Population Density
Leafy Spurge	dry-up	1-10 plts/ft^2

Herbicide Application: Trt. 8,9,11,12

Sprayer: Backpack Date: 5/11/82
Propellent: CO_2
Time: 3:00 p.m.
Wind: 0-2 mph
NE direction
Pressure: 30 Volume: 13 gpa
Nozzles: 8002
Rel. humidity: 47%
Air temperature: 52°F
Soil temp.: 2" 50°F 4" 44°F

Crop Stage

Weeds Present	Stage of Growth	Population Density
Leafy Spurge	4-7" prebud to bud	1-10 plts/ft^2

Grasses Seeded:
Slender Wheatgrass
Pubescent Wheatgrass
Western Wheatgrass
Thickspike

PURPOSE: We will measure the effect of fertilizer on grass growth after controlling leafy spurge. We will measure the regrowth of spurge following vigorous grass competition.

Experiment No.: 81101004 Map No.: 9

Title: Fertilizer Effects on Grass Growth and Herbicide Activity on Leafy Spurge

Notes: Plot size: 7 ft. x 20 ft.

Fertilizer Application: P_2O_5, 80#/A, 10/27/81 (On Treatments 1, 2, 3)
N, 50#/A, 10/27/81 (On Treatments 1, 2, 3)
N, 100#/A, 10/27/81 (On Treatments 4-12)

Treatment No.	Grass Seeded or Herbicide	Rate lb/A	Timing	Plot Number Rep I	Rep II	Rep III
1	Slender Thickspike	2 8		101	203	303
2	Slender Pubescent	2 8		102	201	302
3	Slender Western	2 8		103	202	301
4	Tordon	1	Fall	104	207	305
5	Tordon	2	Fall	105	210	309
6	Tordon (G)	1	Fall	106	205	304
7	Tordon (G)	2	Fall	107	208	310
8	Banvel	2	Spring	110	209	308
9	Banvel	4	Spring	109	204	306
10	Check	(Fertilized)		108	206	307
11	Tordon	1	Spring	112	211	312
12	Tordon	2	Spring	111	212	311
13	Check	(Unfertilized)		113	213	313

EXP. NO. 81101004. THE EFFECT OF FERTILIZER ON HERBICIDE ACTIVITY ON LEAFY SPURGE. GILLESPIE RANCH. WHITEHALL, MT.

TREATMENT

TRT NO	HERB	RATE LB/A		6-1-82 % SPURGE CONTROL	6-1-82 % GRASS INJURY
1	TORDON	1	FALL	88.0	6.0
2	TORDON	2	FALL	99.7	9.0
3	TORDON(G)	1	FALL	67.0	3.3
4	TORDON(G)	2	FALL	96.7	14.3
5	CHECK			.0	.0
6	BANVEL	4	SPR	56.7	4.0
7	BANVEL	2	SPR	56.0	3.3
8	TORDON	2	SPR	77.3	7.7
9	TORDON	1	SPR	60.7	5.0
10	UNFERTILIZED CHECK			.0	4.3
		C.V. -		23.27	67.69
		LSD 5% -		24.03	6.62

EXPERIMENT NO.: 81101006

TITLE: Screening trial of new herbicides for control of Leafy Spurge, Gillespie Ranch, Whitehall.

Crop Information

Crop	pasture	Seeding depth	
Planted		Row width	
Experimental design	RCB	Seeding rate	
Replications	3	Plot size	7 x 20

Herbicide Application

Sprayer	Backpack Date 7/2/81	Pressure	30 Volume 19 gpa
Propellent	CO_2	Nozzles	
Time	Afternoon	Rel. humidity	58%
Wind:	2-8 mph	Air temperature	72°F
	SE direction	Soil temp.:	2" 4"

Crop Stage

Weeds Present	Stage of Growth	Population Density
Leafy Spurge	seed set to reddening	1-12 plts/ft^2

Purpose: Each year we test herbicides for control of spurge. There are no promising new candidates at this time which are as effective as Tordon or Banvel.

Experiment No.: 81101006 Map No.: 10

Title: Screening Trial for Herbicide Control of Leafy Spurge

Notes: Plots = 7ft. x 20 ft.

Treatment No.	Herbicide	Rate lb/A	Plot Number Rep I	Rep II	Rep III
1	X-77 .12% Krenite	2.0	101	208	312
2	X-77 .12% Krenite	4.0	102	212	305
3	X-77 .12% Krenite	6.0	103	207	310
4	Roundup	1.0	104	205	309
5	Roundup	2.0	105	204	311
6	Roundup	4.0	106	209	302
7	Tordon	0.5	107	211	304
8	Tordon	1.0	108	206	303
9	Check		109	202	308
10	Tordon	2.0	110	203	307
11	Banvel	2.0	111	210	301
12	Banvel	4.0	112	201	306

EXPERIMENT NO.: 82101002

TITLE: Control of Leafy Spurge in rangeland. Gillespie Ranch, Whitehall.

Crop Information

Crop pasture
Planted
Experimental design RCB
Replications 3

Seeding depth
Row width
Seeding rate
Plot size 7 x 20'

Herbicide Application

Sprayer Backpack Date 5/11/82
Propellent CO_2
Time Afternoon
Wind: 0-2 mph
NE direction

Pressure 30 Volume 13 gpa
Nozzles 8002
Rel. humidity 47%
Air temperature 52°F
Soil temp.: 2" 50°F 4" 44°F

Crop Stage

Weeds Present	Stage of Growth	Population Density
Leafy Spurge	2-7" pre bud	0-8 plts/ft^2

Experiment No.: 82101002 Map No.: 3

Title: Control of Leafy Spurge on Rangeland

Notes: Plots Size = 7ft. x 20 ft.

Treatment No.	Herbicide	Rate lb/A	Plot Number Rep I	Rep II	Rep III
1	DPX T6376	.5 oz	101	208	306
2	DPX T6376	1.0 oz	102	207	308
3	DPX T6376	2.0 oz	103	214	312
4	DPX T6375	4.0 oz	104	202	305
5	Banvel	4.0	105	210	311
6	Banvel	5.0	106	205	313
7	Banvel	6.0	114	201	307
8	Tordon	.5	108	209	310
9	Tordon	1.0	109	206	304
10	Tordon	1.5	113	213	309
11	Tordon	2.0	111	203	301
12	Hoe 00661	1.0	112	211	314
14	Check		107	212	303