NRDIR/ MEVE-3077

Alyssum allysoides and Ranunculus testiculatus Monitoring Project
Mesa Verde National Park, 1999

Cheryl Coon and Matthew Schultz

Introduction

Over the past two or three years, populations of *Alyssum allysoides* and *Ranunculus testiculatus* have increased noticeably in areas of the Park. These high population areas seem to correlate with disturbance and decreased overstory canopy. Initial populations are visible along road areas where hazard fuel reduction by fire personnel has taken place. Whether these populations will spread further into these disturbed areas is of concern. It is believed that these species may possess allelopathic properties that would increase their invasion potential and pose a serious threat to native vegetation.

To determine the rate of spread of these two species and their effects on native species, seven monitoring transects were established in the park in areas where the plants were present. By monitoring yearly changes in *A. allysoides* and *R. testiculatus* coverage along transects, we will be able to determine population densities and their rate of spread. Other herbaceous and woody plants monitored along transects will determine whether *A. allysoides* and *R. testiculatus* seem to have a thinning effect on them. If such a competitive advantage over other species is seen, it may suggest allelopathic characteristics of *A. allysoides* and/or *R. testiculatus*.

Materials and Methods

Each transect is thirty meters long marked by two 18-inch orange aluminum stakes. The 0 meter stake is stamped on the end with a number and colon, while the 30 meter stake is marked with the same number, but no colon (for example, transect two would have the stakes marked 2: and 2). These transects should always be read in the same direction from 0 to 30 meters). The azimuth from the 0 m to the 30 m stake was recorded to assist with future relocation of transects. There were seven transects (0-5 and 7) established in 1999 (see Figure I and Table 1 for locations).

Vegetation percent cover was estimated using a 0.5 meter x 0.5 meter square. This was placed to the right side of the transect line (viewing from 0 to 30 meter) at every 3 meters starting with 0 meters and going to 27 meters. The square was placed between the initial meter (0.0, 3.0, 6.5, ... 27.0) and its half meter (0.5, 3.5, 6.5, ... 27.5). Vegetation within the square was viewed from overhead and the percent cover for the following categories recorded:

native grass, non-native grass, native forb, non-native forb, native woody, non-native woody, yucca/cactus, *Alyssum allysoides*, *Ranunculus testiculatus*.

For each transect the average percent cover for each of the above categories was calculated (Table 2). It should be noted at this time that when the plots were installed (June 15-17) that the *Ranunculus* had already gone to seed and the plants had died.

Therefore, percentage cover of these species was estimated upon seeds found. In future, monitoring of these plots should be done earlier, perhaps in May.

Canopy cover was determined by measuring the meters of the transect directly below overstory. Percent canopy cover was then calculated by dividing the meter measurements by thirty meters (Table 3). Comparisons of canopy cover between plots may provide us with a better understanding of the species' light requirements and how hazardous fuel reduction affects the spread of these two non-natives.

Table 1. Transect Location Descriptions

Transect	Location *
0	From SE corner of Nat. Res. Lab, take heading of 130 degrees and go approximately 34 meter to 0: transect stake
1	From helibase diptank, take heading of 110 degrees and go approximately 18 meters to 1: transect stake
2	Travel 35 meters south of gate 16 located in Museum Loop Picnic area. The 2: transect stake is 10.5 meters east of the gate.
3	From N facing brown sign designating routes to Cliff Palace, Balcony House and Mesa Top Loop (3-way intersection), travel north along road for 70 meters. 3: transect stake is located just off the W side of road
4	Located on Mesa Top Loop road 34 meters after 2-way traffic splits into one-way. Transect runs alongside a culvert ditch on the left (SE) side of the road.
5	Located 83 meters from the entry gate leading to Cliff Palace/Mesa Top Loops (3-way stop intersection). 5: transect stake is on the east side of the road near culvert ditch behind pinyon sapling 7 meters from road.
7	Located on southern edge of the employee white housing loop, south of house #27. From green water treatment cover, bear 160 degrees for 11.3 meters to reach 7: transect stake.

* See Original Datasheets and Fig. I for additional info to find transects, if needed.

Results, 1999

Ranunculus testiculatus was only found in two transects. It is believed this is because the plants had already gone to seed and died. Visually these plants were almost impossible to find. In future, larger percentage cover may be found if the transects are sampled earlier in the year. Therefore, increases over the data in 1999 may not be due to increases in population, but instead due to increased ability to detect the plants. Data in following years should be considered baseline/reference *Ranunculus* data instead of that collected in 1999.

Table 2. Average Percent Cover of vegetation in *Alyssum allysoides/Ranunculus testiculatus* monitoring transects for 1999.

Transect	Aly	Ran	Fnat	Fnon	Gnat	Gnon	W nat	Yucca	Moss
0	11.0	--	10.2	2.0	13.0	1.0	3.5	--	--
1	6.1	5.7	14.6	1.5	2.9	7.3	1.0	--	--
2	0.8	1.1	7.2	1.9	1.3	0.1	0.5	--	0.2
3	3.0	--	8.5	--	22.3	--	15.2	--	--
4	1.7	--	2.0	--	2.1	2.2	--	0.7	--
5	4.2	--	6.6	0.1	6.5	1.0	4.5	--	--
7	12.5	--	8.3	--	18.2	1.1	1.0	--	--

Aly=*Alyssum allysoides*; Ran=*Ranunculus testiculatus*; Fnat=native forb; Fnon=non-native forb; Gnat=native grass; Gnon=non-native grass; W nat=native woody; Yucca=yucca; Moss=moss. Note: no non-native woody plant was found in any transect.

Table 3. Percent Canopy Cover in *Alyssum allysoides/Ranunculus testiculatus* monitoring transects for 1999.

Transect	Percent Canopy Cover
0	2
1	0
2	36
3	0
4	44
5	14
7	14

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 0:-0 **Azimuth 216°**

Date 6/15/99 **Canopy cover (m) 0.5** **Recorder(s) Coon**

Location Description: From the southeast corner of the Natural Resources Lab, take heading of 130°and go approximately 34 meters to 0: stake.

GPS File: ALLY_0

Meter	Vegetation	% Cover
0	*Alyssum*	6
	Native forb	25
	Native grass	15
3	*Alyssum*	30
	Native grass	10
	Native woody shrub	35
6	*Alyssum*	20
9	*Alyssum*	50
	Native forb	12
12	*Alyssum*	2
	Native forb	25
15	Native forb	10
	Native grass	10
18	*Alyssum*	2
	Native forb	5
	Native grass	40
21	Native forb	5
	Native grass	25
24	Native forb	10
	Native grass	25
27	Native forb	10
	Native grass	5
	Non-native forb	20
	Non-native grass	10

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 1:-1 **Azimuth 40°** **Page 1 of 2**

Date 6/16/99 **Canopy cover (m) 0** **Recorder(s) Schultz, Eloyd**

Location Description: From the helibase diptank, take heading of 110° and go approximately 18 meters to reach 1: transect marker.

GPS File: ALLY_1

Meter	Vegetation	% Cover
0	*Alyssum*	35
	Native forb	15
3	*Alyssum*	10
	Native forb	15
	Non-native grass	3
6	*Alyssum*	5
	Native forb	30
	Non-native forb	10
	Non-native grass	15
9	Native forb	30
	Native grass	3
	Non-native grass	2
12	*Ranunculus*	10
	Native forb	10
	Native grass	5
	Non-native grass	15
15	*Alyssum*	10
	Ranunculus	5
	Native forb	10
	Native grass	7
	Non-native grass	10
18	*Alyssum*	1
	Ranunculus	10
	Native forb	10
	Native grass	2
	Non-native grass	5
21	*Ranunculus*	5
	Native forb	7
	Native grass	5
	Native woody shrub	10
	Non-native grass	15

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 1:-1 Azimuth 40°

Date 6/16/99 Canopy cover (m) 0 Recorder(s) Schultz, Lloyd

Location Description: From the helibase diptank, take heading of 110° and go approximately 18 meters to reach 1: transect marker.

GPS File: ALLY_1

24	*Ranunculus*	15
	Native forb	12
	Native grass	2
	Non-native grass	5
27	*Ranunculus*	12
	Native forb	7
	Native grass	5
	Non-native grass	3

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 2:-2 **Azimuth 165°** **Page 1 of 1**

Date 6/16/99 **Canopy cover (m) 11** **Recorder(s) Coon, Schultz, Lloyd**

Location Description: Travel 35 meters south of gate 16 located in Museum Loop Picnic Area. The 2: transect marker is located 10.5 meters east of the road.

GPS File: ALLY_2

Meter	Vegetation	% Cover
0	*Alyssum*	1
	Native grass	3
	Non-native grass	1
3	*Alyssum*	3
	Ranunculus	2
	Native forb	5
	Native grass	2
6	*Alyssum*	2
	Ranunculus	1
	Native forb	5
	Non-native forb	15
9	*Alyssum*	1
	Native forb	7
	Native grass	1
12	*Alyssum*	1
	Ranunculus	3
	Moss	2
	Native forb	10
	Native grass	1
15	Native forb	2
	Native grass	2
	Native woody shrub	5
18	Native forb	4
	Non-native forb	4
21	*Ranunculus*	2
	Native forb	4
	Native grass	4
24	*Ranunculus*	3
	Native forb	15
27	Native forb	20

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 3:-3 Azimuth 330° Page 1 of 1

Date 6/16/99 Canopy cover (m) 0 Recorder(s) Coon, Schultz, Lloyd

Location Description: From the north facing brown sign designating routes to Cliff Palace, Balcony House and Mesa Top Loop at 3-way intersection, travel north along the west side of the road for 70 meters. The 3: transect marker is located just off the west side of the road.

GPS File: ALLY_3

Meter	Vegetation	% Cover
0	*Alyssum*	10
	Native forb	20
	Native grass	15
3	*Alyssum*	20
	Native grass	40
6	Native forb	1
	Native grass	20
9	Native grass	30
	Native woody shrub	20
12	Native forb	2
	Native grass	30
	Native woody shrub	50
15	Native forb	2
	Native grass	3
18	Native grass	15
	Native woody shrub	20
21	Native forb	25
	Native woody shrub	35
24	Native forb	5
	Native grass	35
	Native woody shrub	20
27	Native forb	30
	Native grass	35
	Native woody shrub	7

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 4:-4 **Azimuth 136°** **Page 1 of 1**

Date 6/17/99 **Canopy cover (m) 13.2** **Recorder(s) Coon, Schultz**

Location Description: Located on the Mesa Top Loop road, 34 meters after two-way traffic splits into one-way. The transect runs alongside a culvert ditch on the left side (SE) of the road.

GPS File: ALLY_4

Meter	Vegetation	% Cover
0	*Alyssum*	15
	Native woody shrub	20
3	*Alyssum*	1
	Native forb	2
	Native grass	10
6	*Alyssum*	1
	Native forb	7
9	Native forb	7
12	No vegetation observed	-
15	Native grass	3
18	Native grass	5
	Native yucca	7
21	Native woody shrub	2
24	No vegetation observed	-
27	Native forb	4
	Native grass	3

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 5:-5 **Azimuth 90°** **Page 1 of 1**

Date 6/17/99 **Canopy cover (m) 4.1** **Recorder(s) Coon, Schultz**

Location Description: The transect is located approximately 83 meters from the entry gate leading to the Cliff Palace and Mesa Top Loop roads near the 3-way stop intersection. The 5: transect marker is located on the east side of the road near a culvert ditch and placed behind a pinyon sapling 7 meters from the road.

GPS File: ALLY_5

Meter	Vegetation	% Cover
0	*Alyssum*	10
	Native forb	5
	Native grass	1
	Native woody shrub	2
3	*Alyssum*	10
	Native forb	1
	Native grass	2
6	*Alyssum*	15
	Native forb	2
	Non-native grass	10
9	*Alyssum*	7
	Native grass	1
	Native yucca	75
12	Native forb	8
	Native grass	25
15	Native forb	20
	Native grass	2
18	Native forb	5
	Native grass	15
	Native woody shrub	3
	Non-native forb	1
21	Native forb	10
	Native grass	4
	Native woody shrub	40
24	Native forb	12
	Native grass	7
27	Native forb	3
	Native grass	8

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 7:-7 Azimuth 200°

Date 6/17/99 Canopy cover (m) 4.3 Recorder(s) Coon, Schultz

Location Description: The transect is located on the southern edge of the employee white housing loop south of house #27. From the green water treatment cover, bear 160° for 11.3 meters to reach the 7: transect marker.

GPS File: ALLY_7

Meter	Vegetation	% Cover
0	*Alyssum*	20
	Native forb	5
	Native grass	7
	Non-native grass	2
3	*Alyssum*	35
	Native forb	2
	Native grass	2
	Non-native grass	7
6	*Alyssum*	55
	Native forb	10
	Native grass	5
	Non-native grass	2
9	*Alyssum*	15
	Native forb	5
	Native grass	8
12	Native forb	3
	Native grass	5
15	Native forb	15
	Native grass	25
18	Native grass	25
	Native woody shrub	10
21	Native forb	25
	Native grass	15
24	Native forb	17
	Native grass	50
27	Native forb	1
	Native grass	40

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 0 - 0 **Azimuth** 216° **Page** 1 **of** 1

Date 6-15-99 **Canopy cover (m)** 0.5 **Recorder(s)** Coon

Location Description : From SE corner of N.R. shed, take heading of 130° and go approximately 34 meters to 0: stake.

Meter	Vegetation	% Cover
1	Alyssum	6
	native forb	25
	native grass	15
3	Alyssum	30
	woody shrub	35
	native grass	10
6	Alyssum	20
9	Alyssum	50
	native forb	12
12	Alyssum	2
	native forb	25
15	native grass	10
	native forb	10
18	Alyssum	2
	native grass	40
	native forb	5
21	native grass	25
	native forb	5
24	native grass	25
	native forb	10
27	non-native forb	20
	non-native grass	10
	native grass	5
	native forb	10

– GPS 6-16-99
ALLY-0

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 1 - 1 **Azimuth** ___ **Page** 1 **of** ___

Date 6-16-99 **Canopy cover (m)** 0 **Recorder(s)** Schultz, Lloyd

Location Description : Cedar Tree
18 meters 110° from Helibase dip tank To : 1
40° from : 1 to 1,

GPS: ALLY_1

Meter	Vegetation	% Cover
1	Alyssum	35
1	Native Forbs	15
3	Allyssum	10
3	Native Forbs	15
3	Non-Native Grass	3
6	Allyssum	5
6	Non-Native Forbs	10
6	Native Forbs	30
6	Non-native Grass	15
9	Native Forbs	30
9	Non-Native Grass	2
9	Native Grass	3
12	Ranunculus	10
12	Non-Native Grass	15
12	Native Forbs	10
12	Native Grass	5
15	Allysum	10
15	Ranunculus	5
15	Native Forbs	10
15	Non-Native Grass	10
15	Native Grass	7
18	Allyssum	1
18	Ranunculus	10
18	Non-Native Grass	5
18	Native Grass	2
18	Native Forbs	10
21	Native Woody	10
21	Ranunculus	5
21	Non-Native Grass	15
21	Native Grass	5
21	Native Forbs	7
24	Ranunculus	15
24	Non-Native Grass	5
24	Native Grass	2
24	Native Forbs	12
27	Ranunculus	12
27	Non Native Grass	3
27	Native Grass	5

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 2:2 **Azimuth** 165° **Page** 1 **of** 1

Date 6/16/99 **Canopy cover (m)** 11 **Recorder(s)** Shultz Coon Lloyd

Location Description : GPS ALLY_2
35 meters South of Gate 16, (Picnic Area)

2: STAKE is 10.5 meters East of Road.

Meter	Vegetation	% Cover
1	Alyssum	1
1	Non-native grass	1
1	Native Grass	3
3	Alyssum	3
3	Native Forbs	5
3	Native Grass	2
3	Ranun.	2
6	Alyssum	2
6	Ranun.	1
6	Non-Native Forb	15
6	Native Forb	5
9	Alyssum	1
9	Native Forb	7
9	Native Grass	1
12	Alyssum	1
12	Moss	2
12	Native Forb	10
12	Ranun.	3
12	Native Grass	1
15	Native Woody	5
15	Native Grass	2
15	" Forb	2
18	Native Forb	4
18	Non-native Forb	4
21	Native Grass	4
21	Native Forb	4
21	Ranun.	2
24	Native Forb	15
24	Ranun	3
27	Native Forb	20

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 3 - 3 **Azimuth** 330° **Page** ___ **of** ___

Date 6/16/99 **Canopy cover (m)** 0 **Recorder(s)** Shultz Lloyd Evert

Location Description : 70 meters from Sign designating Routes To Cliff Palace, Balcony House, & Mesa Top (3 way) Loop To : 3 ~~MI~~ The direction Toward the 4 way ALLY_3 intersection.

Meter	Vegetation	% Cover
0	Alyssum	10
0	Native Grass	15
0	Native Forbs	20
3	Alyssum	20
3	Native Grass	40
6	Native Grass	20
6	Native Forb	1
9	Native Grass	30
9	Native Woody	20
12	Native Grass	30
12	Native Woody	50
12	Native Forb	2
15	Native Grasses	3
15	Native Forb	2
18	Native Woody	20
18	Native Grass	15
21	Native Woody	35
21	Native Forbs	25
24	Native Grasses	35
24	Native Forb	55
24	Native Woody	20
29	N. Grass	35
27	N. Forb	30
27	N. Woody	7

Sign looks like this:

← CLIFF PALACE
← BALCONY HOUSE
↑ MESA TOP LOOP

Comment: No other patches of Alyssum were found on the west side of the road.

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 4 - 4 **Azimuth** 136° **Page** 1 **of** 1

Date 6/17/99 **Canopy cover (m)** 13.2 **Recorder(s)** Sah. Hz + Cam

Location Description : Located on the Mesa Top Loop @ 34 meters after two way traffic splits into one-way. The transect runs along a ecotone ditch on the left side (SE) of the road. GPS: ALLY_4

Meter	Vegetation	% Cover
0	Alyssum	15
0	Native Woody	20
3	Alyssum	1
3	NS Grass	10
3	N. Forb	2
6	Alyssum	1
6	N. Forb	7
9	N. Forb	7
12	—	—
15	N. Grass	3
18	N. Grass	5
18	N. Yucca	7
21	N. Woody	2
24	—	—
27	N. Grass	3
27	N. Forb	4

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 5 - 5 **Azimuth** 90° **Page** 1 **of** 1

Date 6/17/97 **Canopy cover (m)** 41 **Recorder(s)** Sal. Kz - Cass

Location Description :
The transect is located ~83 meters from the entry gate leading to the Cliff Palace and Mesa Top Loops near the 3 way stop intersection. The transect marker is located on the east side of the road near a culvert ditch and placed behind a pinyon pine sapling 7 meters from the road.

Meter	Vegetation	% Cover
0	Alyssum	10
0	Native Grass	1
0	N. Forbs	5
0	N. Woody	2
3	Alyssum	10
3	N. Grass	2
3	N. Forb	1
6	Alyssum	15
6	Non-Native Grass	10
6	N. Forb	2
9	Alyssum	7
9	Yucca	75
9	N. Grass	1
12	N Grass	25
12	N. Forbs	8
15	N. Grass	2
15	N. Forb	20
18	Non Forb	1
18	N. Forb	5
18	N. Grass	15
18	N. Woody	3
21	N. Grass	4
21	N. Forb	10
21	N. Woody	40
24	N. Grass	7
24	N. Forb	12
27	N. G	8
27	N. F	3

Alyssum allysoides and Ranunculus testiculatus Monitoring Project Datasheet

Transect 7 - 7 **Azimuth** 290° **Page** 1 **of**

Date 6/17/99 **Canopy cover (m)** 4.3m **Recorder(s)** Coon/Shultz

Location Description : The transect is located on the southern edge of the employee white housing loop south of house #27. From the green water treatment cover bear 160° for 11.3 meters to reach the transect marker with the ";".

GPS : ALLY_7

Meter	Vegetation	% Cover
0	Alyssum	20
0	N. grass	7
0	N. forb	5
0	Non-grass	2
3	Alyssum	35
3	N. Grass	2
3	N. Forb	2
3	Non-Grass	7
6	Alyssum	55
6	N. Forb	10
6	N. Grass	5
6	Non-Grass	2
9	Alyssum	15
9	N. Grass	8
9	N. Forb	5
12	N. Grass	5
12	N. Forb	3
15	N. Grass	25
15	N. Forb	15
18	N. Grass	25
18	N. Woody	10
21	N. Grass	15
21	N. Forb	25
24	N. Grass	50
24	N. Forb	17
27	N. Grass	90
27	N. Forb	1