

Trend Study 15-7-04

Study site name: Airplane Spring .

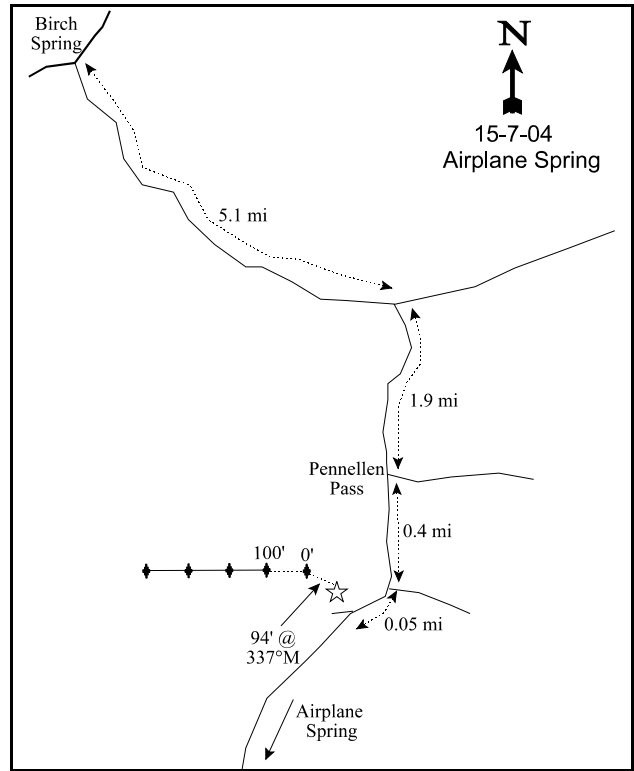
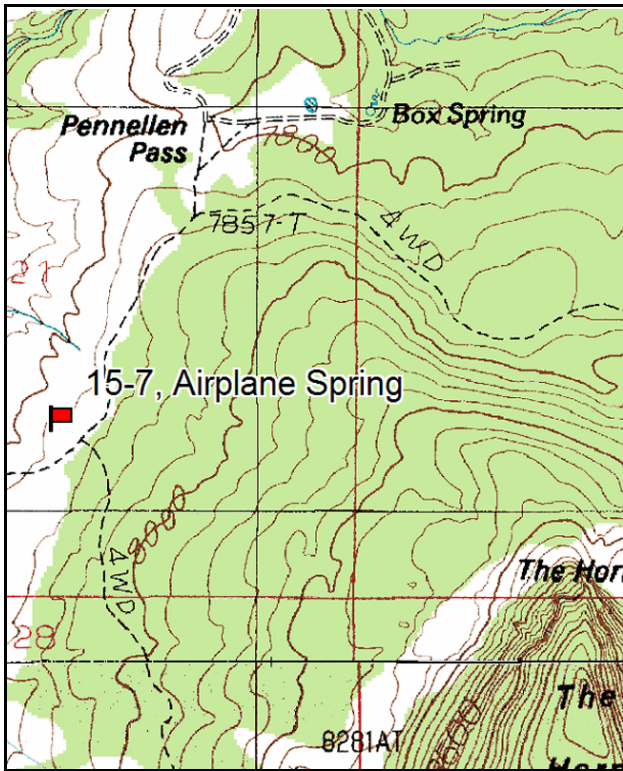
Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 263 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Birch Spring (T32S, R10E, Sec. 6), travel southeast for 5.1 miles. Turn right, go 1.9 miles past Box Spring to a major intersection at Pennellen Pass. Bear right, and go 0.4 miles to another intersection. Bear right towards Airplane Spring, but go only about 0.05 miles (200 feet) to a pullout on the right. A witness post is located 117 feet off the main road. The first baseline stake is 94 feet northwest (at 337° M) of the witness post. The transect stakes are 2-foot tall fence posts, the first one is marked with browse tag #7174.



Map Name: Mount Ellen

Diagrammatic Sketch

Township 32S , Range 10E , Section 21

GPS: NAD 27, UTM 12S 4206189 N, 516487 E

DISCUSSION

Airplane Spring - Trend Study No. 15-7

The Airplane Spring study site is located within a chaining at an elevation of 7,700 feet. The slope is variable over the site, ranging from 11-18%. The aspect is west to southwest. This chaining project was completed during the mid-1960's. The Bulldog fire, which burned in 2003, burned the area just west of this site, but not directly on the study area. This portion of the chaining is in the Pennell Allotment and is a key area for bison and deer. The nearest water source is Airplane Spring which is one-half mile downslope from the site. The study site is within a few hundred feet of the road that links Airplane Springs with Box Springs. Use of the road would be expected to be light except during the hunting seasons. Rabbit use was high in 1999 with 61% of the quadrats containing rabbit pellets. Use from wildlife was low with 4 deer days use/acre (10 ddu/ha) estimated in 1999, and only 1 bison day use/acre (2 bdu/ha). Livestock use was moderate with an estimated 20 cow days use/acre (49 cdu/ha) in 1999. In 2004 cow use decreased to 6 cow days use/acre (14 cdu/ha). For wildlife, deer use increased to 13 deer days use/acre (33 ddu/ha) and bison use was estimated at 20 bison days use/acre (48 bdu/ha).

The soil is a reddish brown, clay loam with a neutral pH (7.0). The site is very rocky both on the soil surface and throughout the profile. Soil depth is moderately shallow due to the rockiness of the site, with an effective rooting depth estimated at just over 11 inches. Erosion was minimal in 2004 due to extreme rockiness and lack of soil on the surface. However, accumulation of soils on the lower end of the slope from the rocky uphill slopes shows that erosion has occurred in the past. Some areas have fairly good litter cover and an organic matter accumulation in the surface horizon, especially beneath the shrubs. The erosion index was determined as stable in 2004.

In 1999, point-quarter estimated the density of pinyon at 80 trees/acre with an average basal diameter of nearly 4 inches. Juniper density was estimated at 60 trees/acre with a basal diameter of nearly 4 inches. Both species combined had a canopy cover of 8% in 1999. In 2004, point-quarter estimates were almost unchanged except for basal diameters which increased slightly. Canopy cover increased to 16%. When pinyon-juniper canopy cover approaches and exceeds 15%, herbaceous cover will typically decline by half. At 25%, herbaceous cover will rarely exceed 1-2% (Tausch and West 1994). Maintenance of this chaining, by reducing pinyon and juniper cover should be a priority to maintain a healthy herbaceous understory.

The study is near the edge of the chaining and approaching the ecotone between the pinyon-juniper and mountain brush types resulting in a diverse mix of browse, but the majority of the species are found infrequently. Species which characterize the mountain brush type that occur in the chaining are Gambel oak, true mountain mahogany, Utah serviceberry, and snowberry. These browse species and the herbaceous understory make this area ideal habitat for mule deer. The majority of the most preferred shrubs showed signs of moderate to heavy hedging since the 1987 reading. Black sagebrush is the most abundant shrub on the site, with an estimated 1,665 plants/acre in 1987, 3,520 in 1994, 5,100 in 1999, and 5,940 by 2004. The change from 1994 to 1999 was from large increases in percent young and mature plants. Due to the age class distribution, this species continued expanding. In 2004, black sagebrush density increased to 5,940 plants/acre. Use remains light and only 3% of the population show signs of poor vigor.

Serviceberry and mountain mahogany are also important preferred browse on the site. All were heavily utilized in 1987, but use has moderated with an increase in density for both species. Use is moderate to heavy for mahogany and serviceberry, but vigor has been good and decadence very low. Broom snakeweed is present at the site, but the density is quite low for this species with an estimated 1,000 plants/acre in 1999, which decreased to 780 plants/acre in 2004. These kind of fluctuations are common for this increaser species in association with drought and wet cycles. Bitterbrush is present on the site but was not sampled.

The most abundant grasses on the site are seeded species. Crested wheatgrass nested frequency decreased between 1987 and 1994, increased in 1999, then decreased again in 2004. Herbaceous production is very dependant on late winter and spring moisture. Crested wheatgrass provided 95% of the grass cover in 1999 and 98% of the grass cover in 2004. Crested wheatgrass is becoming more abundant because it is more drought tolerant than the other species on this site. Intermediate wheatgrass has continued to decrease since 1987, and was only sampled in 4% of the quadrats in 2004. This would be expected with continuing drought. Both species were observed as only lightly utilized in 1999 and 2004. Native grasses have practically disappeared from the understory with a sum of nested frequency for all species together of 21 in 1999 and only 11 in 2004. Forbs in the understory are diverse, but infrequent with only 1.4% cover in 1999 and only 0.8% cover in 2004. The key species, alfalfa, was numerous in 1987, but like other sites in this unit, this species has declined significantly due to drought. Alfalfa was heavily utilized prior to July 1987, but still appeared vigorous. In 1999, alfalfa showed moderate to heavy use, some used down to the ground. Alfalfa was found in 19% of quadrats in 1987, but was only found in 3% in 2004.

1994 TREND ASSESSMENT

Ground cover characteristics are similar to those of 1987. The abundant herbaceous vegetative cover, combined with the gently slope helps to prevent erosion. Trend for soil is stable. Key browse on the site consist of black sagebrush, serviceberry, mountain mahogany, bitterbrush, and snowberry. All have increased in density, show low rates of decadency, and are less heavily utilized than they were in 1987. Trend for browse is up. Herbaceous plants appear to be declining on this site perhaps due to the increased dominance of shrubs and trees in conjunction with extended drought. Sum of nested frequencies for perennial grasses and forbs have declined by 31% indicating a downward trend.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - down (1)

winter range condition (DC index) - 51 (fair) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Soils continue to show a stable trend. The proportion of protective ground cover (vegetation and litter) to bare ground slightly increased from 1994 to 1999. Erosion continues to be minimal due to the abundance of rock and herbaceous cover. Trend for browse is slightly up and improving. The key species black sagebrush, serviceberry, and true mountain mahogany provide half of the browse cover. Densities for all these species are stable or increasing, vigor is improving, and percent decadency is low. Herbaceous understory trend is stable. The key species, crested wheatgrass, increased in nested frequency and cover. Sum of nested frequency for all perennial grasses combined slightly declined, but nested frequency for perennial forbs slightly increased. Annuals are almost non-existent in the understory.

TREND ASSESSMENT

soil- stable (3)

browse- slightly up (4)

herbaceous understory- stable (3)

winter range condition (DC index) - 68 (good) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

Soils continue to show a stable trend. The proportion of protective ground cover (vegetation and litter) to bare ground slightly decreased from 1999 to 2004. Erosion continues to be minimal due to the abundance of rock,

litter, and herbaceous cover. Trend for browse is considered stable. The key species black sagebrush increased, serviceberry decreased slightly, and true mountain mahogany also decreased slightly. Overall, these key preferred species still provide about 45% of the browse cover. All these species have good vigor and percent decadency is very low. Herbaceous understory trend is slightly down because of the decline of crested wheatgrass, which decreased significantly in nested frequency and cover. Sum of nested frequency for all perennial grasses combined declined by almost 20%. The drought has had a noticeable effect on the herbaceous species. Annuals still remain almost non-existent in the understory. Perennial forb cover and nested frequency is about half of what it was in 1999, which was poor then.

TREND ASSESSMENT

soil- stable (3)

browse- stable (3)

herbaceous understory- slightly down (2)

winter range condition (DC index) - 63 (fair-good) Mountain big sagebrush/chaining type

HERBACEOUS TRENDS --

Management unit 15 , Study no: 7

Type	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	c306	ab234	bc264	a233	11.67	19.07	14.83
G	Agropyron intermedium	c122	b58	a28	a7	1.04	.64	.04
G	Bouteloua gracilis	1	5	-	1	.01	-	.03
G	Bromus tectorum (a)	-	6	-	3	.01	-	.01
G	Festuca ovina	ab2	a-	b8	ab4	-	.24	.04
G	Oryzopsis hymenoides	-	-	2	-	-	.03	-
G	Poa fendleriana	a-	b19	ab10	a3	.15	.10	.03
G	Sitanion hystrix	c73	b28	a1	ab7	.15	.01	.07
Total for Annual Grasses		0	6	0	3	0.00	0	0.01
Total for Perennial Grasses		504	344	313	255	13.03	20.11	15.05
Total for Grasses		504	350	313	258	13.05	20.11	15.07
F	Arabis spp.	-	-	11	-	-	.02	-
F	Aster spp.	-	4	-	-	.01	-	-
F	Astragalus spp.	3	-	2	3	-	.03	.00
F	Astragalus utahensis	-	-	-	1	-	-	.00
F	Castilleja linariaefolia	-	-	-	-	-	-	.00
F	Castilleja spp.	-	-	4	-	-	.03	-
F	Chenopodium fremontii (a)	-	-	-	5	-	-	.04
F	Cymopterus spp.	-	3	-	-	.01	-	-
F	Erigeron eatonii	b27	b29	ab15	a6	.29	.09	.01
F	Eriogonum umbellatum	-	3	2	9	.03	.03	.06
F	Gayophytum ramosissimum(a)	-	b12	a-	b19	.02	-	.04
F	Hedysarum boreale	-	2	-	-	.03	-	-

T y p e	Species	Nested Frequency				Average Cover %		
		'87	'94	'99	'04	'94	'99	'04
F	<i>Hymenoxys acaulis</i>	14	8	10	5	.02	.05	.01
F	<i>Hymenoxys richardsonii</i>	-	-	6	2	-	.01	.03
F	<i>Lappula occidentalis</i> (a)	-	_b 19	_a 5	_{ab} 18	.05	.02	.06
F	<i>Lesquerella kingii</i>	_a 2	_a 4	_b 19	_a -	.01	.06	-
F	<i>Medicago sativa</i>	_b 49	_a 9	_a 19	_a 6	.90	.96	.45
F	<i>Orthocarpus</i> spp. (a)	3	-	-	-	-	-	-
F	<i>Penstemon</i> spp.	_a -	_{ab} 9	_{ab} 1	_b 9	.01	.00	.13
F	<i>Phlox longifolia</i>	_a -	_{ab} 10	_b 9	_{ab} 3	.02	.05	.00
F	<i>Polygonum douglasii</i> (a)	-	7	1	12	.01	.00	.03
F	<i>Schoenocrambe linifolia</i>	_b 15	_a 3	_a -	_a -	.00	-	-
F	<i>Sphaeralcea coccinea</i>	3	7	7	4	.33	.07	.07
F	<i>Tragopogon dubius</i>	3	-	-	-	-	-	-
F	Unknown forb-perennial	1	-	-	-	-	-	-
Total for Annual Forbs		3	38	6	54	0.08	0.02	0.18
Total for Perennial Forbs		117	91	105	48	1.68	1.44	0.79
Total for Forbs		120	129	111	102	1.77	1.46	0.97

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 15 , Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	9	6	4	1.11	1.01	.06
B	Artemisia nova	41	54	55	3.51	6.68	6.87
B	Artemisia tridentata vaseyana	3	0	0	.38	-	.15
B	Cercocarpus montanus	9	11	12	1.62	1.25	2.03
B	Chrysothamnus depressus	4	10	4	.15	.03	.03
B	Chrysothamnus nauseosus graveolens	2	3	2	.00	.00	-
B	Chrysothamnus viscidiflorus viscidiflorus	4	5	2	.03	.00	.03
B	Gutierrezia sarothrae	14	12	13	.38	.21	.41
B	Juniperus osteosperma	0	5	4	1.25	2.00	2.36
B	Opuntia spp.	2	1	1	.00	-	-
B	Pinus edulis	0	6	7	4.11	6.48	8.69
B	Purshia tridentata	1	1	0	.15	.00	-
B	Quercus gambelii	0	1	0	-	-	-
B	Ribes leptanthum	0	1	1	-	.03	.30
B	Sclerocactus	0	1	1	-	.03	-
B	Symphoricarpos oreophilus	2	2	2	.16	.03	.03
Total for Browse		91	119	108	12.90	17.80	20.98

CANOPY COVER, LINE INTERCEPT --

Management unit 15 , Study no: 7

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	.20	1.14
Artemisia nova	-	7.13
Artemisia tridentata vaseyana	-	.23
Cercocarpus montanus	.40	2.54
Chrysothamnus viscidiflorus viscidiflorus	-	.21
Gutierrezia sarothrae	-	.71
Juniperus osteosperma	1.00	2.26
Pinus edulis	7.19	13.26
Ribes leptanthum	-	1.39
Symphoricarpos oreophilus	-	.85

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 15 , Study no: 7

Species	Average leader growth (in)
	'04
Amelanchier utahensis	2.2
Artemisia nova	1.7
Cercocarpus montanus	3.1

POINT-QUARTER TREE DATA --
Management unit 15 , Study no: 7

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	60	57
Pinus edulis	80	78

Average diameter (in)	
'99	'04
3.9	4.5
3.9	4.2

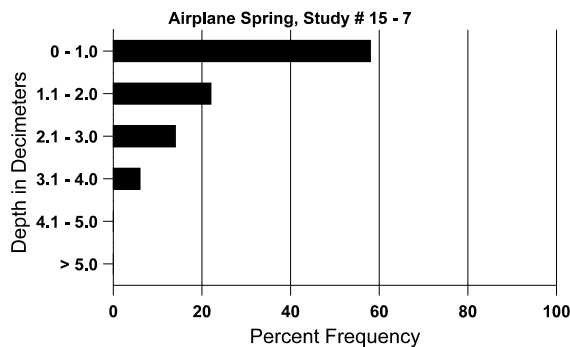
BASIC COVER --
Management unit 15 , Study no: 7

Cover Type	Average Cover %			
	'87	'94	'99	'04
Vegetation	6.50	28.12	37.69	36.76
Rock	19.50	22.58	28.07	25.61
Pavement	4.25	2.94	9.41	7.90
Litter	57.50	33.31	28.98	32.45
Cryptogams	.50	.18	.25	.12
Bare Ground	11.75	11.27	12.93	14.67

SOIL ANALYSIS DATA --
Management unit 15, Study no: 7, Study Name: Airplane Spring

Effective rooting depth (in)	Temp °F (depth)	pH	% sand	% silt	% clay	%OM	PPM P	PPM K	ds/m
11.2	50.4 (13.2)	7.0	44.0	27.4	28.6	5.2	17.7	156.8	0.7

Stoniness Index



PELLET GROUP DATA --

Management unit 15 , Study no: 7

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	18	61	14
Deer	8	12	19
Cattle	-	5	-
Buffalo	-	1	1

Days use per acre (ha)	
'99	'04
-	-
4 (10)	13 (33)
20 (49)	6 (14)
1 (2)	20 (48)

BROWSE CHARACTERISTICS --

Management unit 15 , Study no: 7

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
87	166	-	33	133	-	-	0	100	0	-	0	33/22
94	220	-	20	180	20	-	27	9	9	9	9	46/58
99	220	20	20	200	-	-	36	9	0	-	0	57/56
04	100	-	-	100	-	-	0	100	0	-	0	59/57
Artemisia nova												
87	1665	4033	1066	566	33	-	8	2	2	1	2	14/21
94	3520	3400	700	2380	440	-	0	0	13	2	18	11/17
99	5100	5440	1780	2800	520	100	15	9	10	.39	.39	12/24
04	5940	100	780	4620	540	280	0	0	9	3	3	10/17
Artemisia tridentata vaseyana												
87	133	133	100	33	-	-	0	0	-	-	0	17/13
94	60	300	20	40	-	-	0	0	-	-	0	16/26
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	21/34
Cercocarpus montanus												
87	66	-	-	66	-	-	50	50	0	-	0	21/30
94	180	-	-	180	-	-	22	44	0	-	0	31/28
99	340	-	80	240	20	-	6	47	6	-	0	42/38
04	240	100	-	240	-	-	17	83	0	-	0	35/41
Chrysothamnus depressus												
87	432	33	366	33	33	-	85	0	8	-	0	4/10
94	100	-	-	100	-	-	0	0	0	-	0	6/14
99	280	-	-	200	80	-	36	50	29	7	7	3/6
04	140	-	-	140	-	-	57	29	0	-	0	6/8

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus graveolens												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	40	40	-	40	-	-	50	50	-	-	50	20/28
99	60	-	-	60	-	20	0	0	-	-	0	26/30
04	40	-	20	20	-	-	0	0	-	-	0	35/42
Chrysothamnus viscidiflorus viscidiflorus												
87	0	-	-	-	-	-	0	0	0	-	0	-/-
94	180	-	-	140	40	-	0	0	22	-	0	3/6
99	140	-	40	80	20	-	0	0	14	-	0	9/12
04	40	-	-	40	-	-	0	0	0	-	0	11/16
Eriogonum microthecum												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	5/13
04	0	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
87	1399	-	833	566	-	-	0	0	0	-	0	10/8
94	660	100	200	400	60	-	0	0	9	9	9	6/7
99	1000	260	480	480	40	60	0	0	4	2	2	6/8
04	780	-	40	740	-	20	0	0	0	-	0	7/8
Juniperus osteosperma												
87	100	33	100	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	100	-	80	20	-	40	0	0	-	-	0	-/-
04	80	-	20	60	-	-	0	0	-	-	0	-/-
Opuntia spp.												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	40	-	20	20	-	-	0	0	-	-	0	0/1
99	20	-	-	20	-	-	0	0	-	-	0	4/4
04	20	-	-	20	-	-	0	0	-	-	0	-/-
Pinus edulis												
87	100	-	100	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	160	-	20	140	-	20	0	0	-	-	0	-/-
04	160	-	40	120	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Purshia tridentata												
87	0	-	-	-	-	-	0	0	0	-	0	-/-
94	20	-	-	-	20	-	0	100	100	-	0	6/24
99	20	-	-	20	-	-	0	100	0	-	0	74/76
04	0	-	-	-	-	-	0	0	0	-	0	12/28
Quercus gambelii												
87	0	-	-	-	-	-	0	0	0	-	0	-/-
94	0	-	-	-	-	-	0	0	0	-	0	-/-
99	160	120	80	60	20	20	0	0	13	-	0	18/22
04	0	-	-	-	-	-	0	0	0	-	0	12/24
Ribes leptanthum												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	60/96
99	20	-	-	20	-	-	0	0	-	-	0	64/67
04	20	-	-	20	-	-	0	0	-	-	0	56/66
Sclerocactus												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	20	-	-	20	-	-	0	0	-	-	0	3/3
04	20	-	-	20	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
87	566	66	300	233	33	-	24	47	6	-	0	21/20
94	40	40	20	20	-	-	50	0	0	-	0	10/21
99	40	-	20	20	-	-	0	0	0	-	0	28/66
04	40	-	-	40	-	-	50	0	0	-	0	21/50