

Trend Study 30-5-08

Study site name: Harmony Mountain Summit .

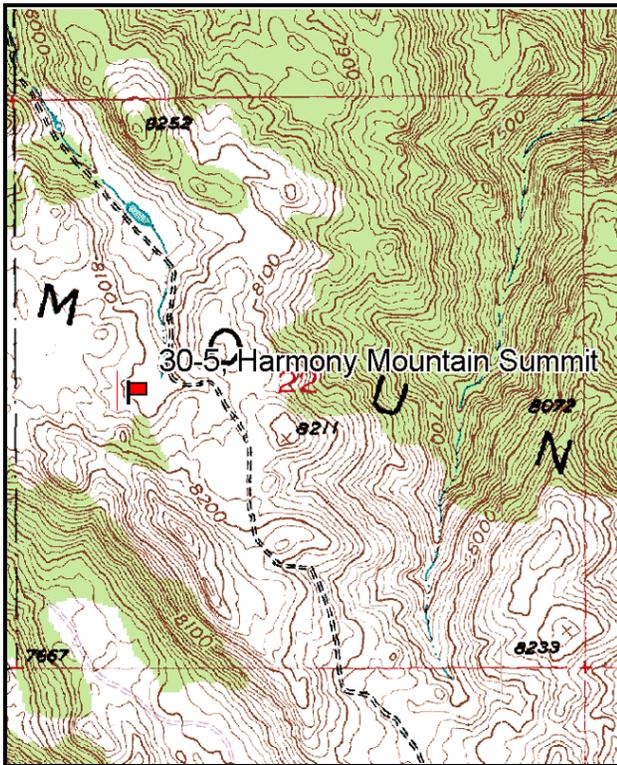
Vegetation type: Low Rabbitbrush .

Compass bearing: frequency baseline 266 degrees magnetic. (Lines 3 & 4, 202°M)

Frequency belt placement: line 1 (12 & 87ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 3 on 1ft.

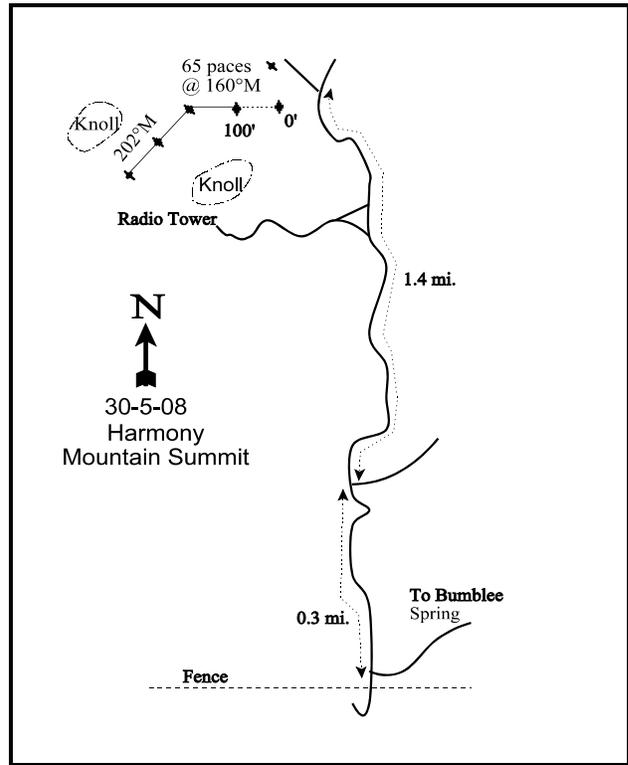
LOCATION DESCRIPTION

From the Dixie National Forest boundary north of New Harmony, proceed north 0.3 miles on Pace Draw Road. Turn right on Harmony Mountain Road and drive 1.0 miles, at which point you should come to a gate. From the fence continue on the main road 4.7 miles to a fork. Stay left and continue on the main road. At 0.3 miles stay left again and continue on the main road 1.4 miles to a fork. Continue left less that 0.1 miles to a witness post on the left (south) side of the road. From the witness post walk 65 paces at 160 degrees magnetic to the 0-foot stake. The study is marked by green steel fence posts approximately 18 to 24 inches in height.



Map Name: Stoddard Mountain

Township 37S, Range 13W, Section 22



Diagrammatic Sketch

GPS: NAD 83, UTM 12S 296480 E, 4160026 N

## DISCUSSION

### Harmony Mountain Summit - Trend Study No. 30-5

#### Study Information

The study monitors deer summer range, characterized by open parks interspersed with scattered aspen and oak clones [elevation: 8,100 feet (2,469 m), slope:10%-15%, aspect: northeast]. The area has been heavily impacted by domestic livestock grazing and undergone a nearly complete type conversion to stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*). What formerly was a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*)-grass type is now dominated by stickyleaf low rabbitbrush, needlegrass species (*Stipa* spp.), and limited numbers of increaser forb species. Cattle were using the site during the 1992 reading in mid-June. Deer utilize the area in summer as two does were encountered on the site during the 1992 reading. Pellet group data estimated heavy deer use in 1998 and 2003 (73 deer days use/acre:180 ddu/acre and 88 ddu/acre:216 ddu/ha, respectively), and decreased to moderate use in 2008 (40 ddu/acre:99 ddu/ha). Cattle use was estimated to be moderate in 1998, 2003, and 2008 (26 cow days use/acre: 64 cdu/ha,32 cdu/acre: 79 cdu/ha, and 27 cdu/acre:66 cdu/ha, respectively).

#### Soils

Soils are relatively deep and formed by sedimentation from surrounding ridges. Effective rooting depth is estimated at just over 17 inches. Soil texture is a sandy loam which is strongly acidic (pH 5.4). Soil organic matter is comparatively high at 4.5%. The principal soil disturbance comes from pocket gopher and rock squirrel activity, as well as livestock trampling. The relative combined average vegetation and litter cover has been high at 87%-91% from 1998 to 2008. The erosion condition was classified as stable in 2003 and 2008.

#### Browse

This area is considered summer range for deer, therefore shrubs are not the key vegetational component. However, the key browse species present on the site is mountain big sagebrush which provided 37% of the browse cover in 1998 and 2008, and 49% cover in 2003. Density of sagebrush increased from 1,532 plants/acre in 1982 to 8,640 plants/acre in 2003, before decreasing slightly to 5,820 plants/acre in 2008. Seedling and young recruitment was good from 1992 to 2003, but decreased significantly in 2008. Utilization is mostly light, vigor good, and decadence was low from 1992 to 2003. Sagebrush decadence increased from 5% in 2003 to 25% in 2008.

Stickyleaf low rabbitbrush is the most abundant shrub on the site. It provided 62% of the total shrub cover in 1998, 50% in 2003, and 60% in 2008. It has had an average density of about 12,000 plants/acre between 1992 and 2008. Young recruitment has been excellent to good with each reading, yet the population is becoming increasingly mature as it has apparently reached its carrying capacity. Most plants are not utilized and are in good vigor. Other browse species found on the site include Parry rabbitbrush (*Chrysothamnus parryi*), slenderbush eriogonum (*Eriogonum microthecum*), barberry (*Mahonia repens*), and snowberry (*Symphoricarpos oreophilus*). A few aspen (*Populus tremuloides*) trees are also found near the baseline.

#### Herbaceous Understory

The herbaceous understory is abundant and diverse although composition consists largely of increaser species. The grass composition is dominated by Letterman needlegrass (*Stipa lettermani*), subalpine needlegrass (*Stipa columbiana*), and needle-and-thread grass (*Stipa comata*). These grasses accounted for 92% of the grass cover in 1998, and 94% in 2003 and 2008. Virtually all grass plants were 30% to 50% utilized in 1982. Many of the grasses were grazed in 1992, but utilization was not estimated. More preferred grasses, which could be considered decreaser species on this site, include low numbers of slender wheatgrass (*Agropyron trachycaulum*) and mountain brome (*Bromus carinatus*).

Forbs are also abundant, except composition consists largely of increasers like pale agoseris (*Agoseris glauca*),

common dandelion (*Taraxacum officinale*), and the poisonous silky lupine (*Lupinus sericeus*). The more palatable species, Indian paintbrush (*Castilleja linariaefolia*) and redroot eriogonum (*Eriogonum racemosum*), have shown evidence of at least moderate use in the past. Pale agoseris and silky lupine produced 69% of the total forb cover in 1998, and 72% in 2003 and 2008. Most other forbs produced less than one-half of 1% cover. Other, more preferred forbs are present, but in low numbers.

#### 1992 TREND ASSESSMENT

The trend for browse is mixed. The key browse species, mountain big sagebrush, has increased dramatically since the last reading. It has good vigor and low decadence. Slender eriogonum has also increased in density. On the downside, the increaser stickyleaf low rabbitbrush has also increased on the site and has an age structure that indicates possible continued increase, especially with continued heavy use of the herbaceous understory by livestock. Trend for browse is up slightly, but close attention should be given to stickyleaf low rabbitbrush in the future. Data in 1982 for the herbaceous understory is limited to species quadrat frequencies. With this in mind, the trend for both grasses and forbs is also slightly up, even though they are dominated by less desirable increaser species and poisonous plants.

browse - slightly up (+1)

grass - slightly up (+1)

forb - slightly up (+1)

#### 1998 TREND ASSESSMENT

Trend for browse is stable. Differences in density of browse species may be related to the larger sample area used in 1998; therefore, trend for browse was determined using other parameters. The mountain big sagebrush population has become more mature, yet young plants are still common. Sagebrush vigor has remained good, and decadence low at only 7%. Stickyleaf low rabbitbrush is still the most abundant shrub on the site. Young rabbitbrush plants are still common, vigor is good, and decadence is low at 8%. Trend for grasses is slightly down. Sum of nested frequency for perennial grasses has declined by 16%, with the nested frequency of subalpine needlegrass declining significantly. The trend for forbs is down. The sum of nested frequency of perennial forbs declined by 27%. Nested frequency of pale agoseris, Indian paintbrush, redroot eriogonum, and silky lupine all declined significantly.

browse - stable (0)

grass - slightly down (-1)

forb - down (-2)

#### 2003 TREND ASSESSMENT

Trend for browse is up, but on a summer range this it not necessarily desirable. Density of mountain big sagebrush has increased by 30% since 1998 to a very high 8,640 plants/acre. The population is dynamic with high numbers of seedlings and young. The increaser, stickyleaf low rabbitbrush, still dominates the browse composition and it has also increased in density to 12,100 plants/acre. This population is also dynamic with abundant young plants. The shrubs together produced 38% cover in 2003. Trend for grasses is slightly down and species composition remains poor due to domination of increaser species. Sum of nested frequency for perennial grasses has declined by 12% with a significant decline in both needle-and-thread and Letterman needlegrass. The average cover of perennial grasses decreased from 20% in 1992 to about 13%. The trend for forbs is down. Sum of nested frequency for perennial forbs declined sharply by 32%. Total forb cover declined from 10% in 1998 to 4%. Some of the decline in grasses and especially forbs is likely due to the incredibly dry conditions during the past few years. Herbaceous plants are the most important vegetational aspect of this site since it is considered summer range. For deer, perennial forbs are very important especially in the spring and early summer. More desirable grasses and forbs are not abundant.

browse - up (+2)

grass - slightly down (-1)

forb - down (-2)

#### 2008 TREND ASSESSMENT

Trend for browse is down. Density of mountain big sagebrush has decreased by 33% to 5,820 plants/acre. Sagebrush plants displaying poor vigor increased to 13%, and decadence increased to 25%. Recruitment of

new sagebrush plants declined drastically with only 3% of the population being comprised of young plants. The density of stickleaf low rabbitbrush decreased slightly to 10,280 plants/acre. Vigor of rabbitbrush remained good and decadence was low. Recruitment of rabbitbrush also declined with only 2% of the population being comprised of young plants. Trend for grasses is stable. Sum of nested frequency of perennial grasses has declined slightly, but there was no significant change in any species nested frequency. The cover of perennial grasses also increased slightly to 15%. The trend for forbs is down. The sum of nested frequency of perennial forbs declined by 32% primarily due to a significant decrease in the nested frequency of pale agoseris. The nested frequency of the poisonous forb silvery lupine increased significantly.

browse - down (-2)

grass - stable (0)

forb - down (-2)

HERBACEOUS TRENDS --

Management unit 30 , Study no: 5

Type	Species					Average Cover %		
		'92	'98	'03	'08	'98	'03	'08
G	Agropyron trachycaulum	-	4	3	-	.09	.00	-
G	Bromus carinatus	<sub>ab</sub> 8	<sub>b</sub> 7	<sub>ab</sub> 3	<sub>a</sub> -	.13	.06	-
G	Carex sp.	7	11	5	3	.56	.41	.03
G	Poa fendleriana	3	7	4	11	.21	.06	.34
G	Poa pratensis	27	20	10	21	.55	.18	.41
G	Stipa columbiana	<sub>c</sub> 289	<sub>ab</sub> 208	<sub>bc</sub> 250	<sub>a</sub> 195	5.40	4.10	3.76
G	Stipa comata	<sub>b</sub> 119	<sub>b</sub> 112	<sub>a</sub> 54	<sub>ab</sub> 86	2.92	.99	1.89
G	Stipa lettermani	<sub>b</sub> 287	<sub>b</sub> 256	<sub>a</sub> 220	<sub>a</sub> 190	10.28	6.90	8.37
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		740	625	549	506	20.17	12.73	14.83
Total for Grasses		740	625	549	506	20.17	12.73	14.83
F	Achillea millefolium	-	7	3	-	.18	.00	-
F	Agoseris glauca	<sub>c</sub> 251	<sub>b</sub> 187	<sub>b</sub> 172	<sub>a</sub> 82	3.87	2.25	.48
F	Antennaria rosea	3	-	-	-	-	-	-
F	Artemisia ludoviciana	3	-	-	-	-	-	-
F	Astragalus sp.	4	2	-	-	.03	-	-
F	Astragalus utahensis	-	6	-	-	.18	-	-
F	Castilleja linariaefolia	<sub>c</sub> 53	<sub>b</sub> 23	<sub>a</sub> 1	<sub>a</sub> 3	.27	.00	.00
F	Calochortus nuttallii	-	2	2	-	.01	.01	-
F	Chenopodium fremontii (a)	-	28	25	18	.13	.10	.04
F	Collinsia parviflora (a)	-	14	3	2	.13	.01	.00
F	Crepis acuminata	<sub>a</sub> -	<sub>b</sub> 34	<sub>a</sub> -	<sub>a</sub> 3	.34	-	.00
F	Delphinium nuttallianum	<sub>a</sub> -	<sub>a</sub> 1	<sub>b</sub> 15	<sub>a</sub> -	.03	.06	-
F	Epilobium brachycarpum (a)	-	3	1	-	.00	.00	-
F	Erigeron eatonii	-	1	8	4	.01	.07	.01
F	Erigeron pumilus	3	2	2	-	.01	.00	-

T y p e	Species					Average Cover %		
		'92	'98	'03	'08	'98	'03	'08
F	<i>Eriogonum racemosum</i>	<sub>a</sub> 4	<sub>b</sub> 12	<sub>ab</sub> 9	<sub>b</sub> 13	.30	.07	.10
F	<i>Fritillaria atropurpurea</i>	1	-	-	-	-	-	-
F	<i>Galium</i> sp.	<sub>a</sub> -	<sub>b</sub> 13	<sub>a</sub> -	<sub>a</sub> -	.21	-	-
F	<i>Gayophytum ramosissimum</i> (a)	-	-	3	6	-	.00	.03
F	<i>Hackelia patens</i>	<sub>a</sub> 10	<sub>b</sub> 28	<sub>ab</sub> 20	<sub>ab</sub> 17	.56	.58	.64
F	<i>Hymenoxys acaulis</i>	-	6	-	-	.01	-	-
F	<i>Hydrophyllum occidentale</i>	3	-	-	-	-	-	.00
F	<i>Lomatium</i> sp.	-	1	6	-	.00	.01	-
F	<i>Lupinus sericeus</i>	<sub>c</sub> 219	<sub>b</sub> 86	<sub>a</sub> 35	<sub>b</sub> 66	3.59	.94	3.39
F	<i>Orthocarpus</i> sp. (a)	-	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 24	-	-	.29
F	<i>Penstemon</i> sp.	-	3	-	-	.03	-	.00
F	<i>Polygonum douglasii</i> (a)	-	<sub>c</sub> 156	<sub>a</sub> 22	<sub>b</sub> 75	.72	.05	.32
F	<i>Taraxacum officinale</i>	<sub>c</sub> 32	<sub>ab</sub> 15	<sub>b</sub> 17	<sub>a</sub> 8	.22	.17	.02
Total for Annual Forbs		0	201	54	125	0.98	0.17	0.69
Total for Perennial Forbs		586	429	290	196	9.90	4.20	4.68
Total for Forbs		586	630	344	321	10.89	4.38	5.37

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

BROWSE TRENDS --

Management unit 30 , Study no: 5

T y p e	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	<i>Artemisia tridentata vaseyana</i>	92	98	88	13.89	18.95	13.56
B	<i>Chrysothamnus nauseosus</i>	0	0	0	-	.03	-
B	<i>Chrysothamnus parryi</i>	0	16	30	-	.32	.72
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	96	96	92	23.36	19.12	21.96
B	<i>Mahonia repens</i>	1	3	3	.06	.01	.00
B	<i>Populus tremuloides</i>	1	0	0	.18	-	-
B	<i>Symphoricarpos oreophilus</i>	1	3	4	.18	.18	.33
Total for Browse		191	216	217	37.68	38.61	36.58

CANOPY COVER, LINE INTERCEPT --

Management unit 30 , Study no: 5

Species	Percent Cover	
	'03	'08
Artemisia tridentata vaseyana	16.51	17.58
Chrysothamnus parryi	.46	2.46
Chrysothamnus viscidiflorus viscidiflorus	22.04	30.28
Mahonia repens	.10	-
Populus tremuloides	3.79	-
Symphoricarpos oreophilus	.91	1.36

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 30 , Study no: 5

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata vaseyana	1.0	1.4

BASIC COVER --

Management unit 30 , Study no: 5

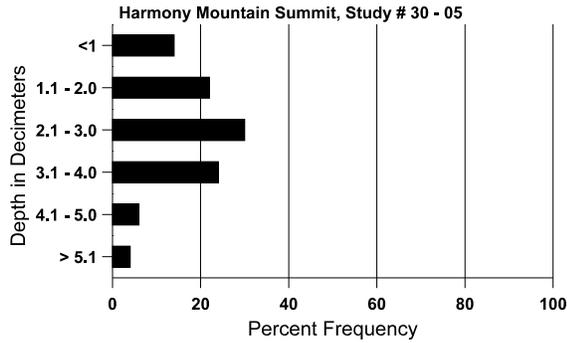
Cover Type	Average Cover %				
	'82	'92	'98	'03	'08
Vegetation	29.00	33.00	60.90	53.04	58.30
Rock	0	0	2.23	1.72	1.69
Pavement	0	.25	1.01	.90	4.48
Litter	61.75	63.25	63.82	54.71	40.27
Cryptogams	0	0	0	0	0
Bare Ground	9.25	3.50	8.60	9.82	7.96

SOIL ANALYSIS DATA --

Management unit 30, Study no: 5, Study Name: Harmony Mountain Summit

Effective rooting depth (in)	Temp °F (depth)	pH	sandy loam			%OM	PPM P	PPM K	ds/m
			% sand	% silt	% clay				
17.2	47.8 (16.1)	5.4	62.0	19.4	18.6	4.5	41.9	268.8	0.4

# Stoniness Index



## PELLET GROUP DATA --

Management unit 30 , Study no: 5

Type	Quadrat Frequency		
	'98	'03	'08
Sheep	2	-	-
Rabbit	-	4	1
Grouse	-	-	2
Deer	44	50	28
Cattle	18	11	24

Days use per acre (ha)		
'98	'03	'08
-	-	-
-	-	-
-	-	-
73 (180)	88 (217)	40 (99)
26 (64)	32 (79)	27 (66)

## BROWSE CHARACTERISTICS --

Management unit 30 , Study no: 5

		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)
<b>Amelanchier utahensis</b>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	16/19
08	0	-	-	-	-	-	0	0	-	-	0	-/-
<b>Artemisia tridentata vaseyana</b>												
82	1531	-	66	799	666	-	57	0	44	-	0	15/12
92	6664	1933	4266	1999	399	-	14	1	6	.60	5	15/30
98	6060	880	1580	4060	420	240	3	0	7	-	.33	16/24
03	8640	340	2500	5740	400	80	15	5	5	2	2	15/24
08	5820	260	200	4160	1460	520	16	.34	25	10	13	17/24

		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)
<b>Chrysothamnus parryi</b>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
92	665	133	266	399	-	-	30	0	0	-	0	7/6
98	0	-	-	-	-	-	0	0	0	-	0	-/-
03	780	-	100	540	140	-	36	0	18	3	3	6/8
08	1860	120	220	1640	-	-	0	0	0	-	0	9/11
<b>Chrysothamnus viscidiflorus viscidiflorus</b>												
82	8665	-	2133	4999	1533	-	0	0	18	-	0	12/15
92	14131	399	3466	9666	999	-	11	1	7	-	2	11/13
98	11140	220	1860	8420	860	20	.35	0	8	-	0	13/21
03	12100	-	1660	9780	660	40	.16	0	5	.16	.16	11/18
08	10280	100	240	9660	380	180	2	0	4	.19	.19	15/23
<b>Eriogonum microthecum</b>												
82	4731	-	1399	2933	399	-	4	0	8	-	0	10/12
92	10798	-	5933	4599	266	-	6	0	2	-	3	5/7
98	0	-	-	-	-	-	0	0	0	-	0	-/-
03	0	-	-	-	-	-	0	0	0	-	0	-/-
08	0	-	-	-	-	-	0	0	0	-	0	-/-
<b>Mahonia repens</b>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
98	120	-	-	120	-	-	0	0	-	-	0	5/7
03	140	-	-	140	-	-	0	0	-	-	0	2/3
08	140	-	120	20	-	-	0	0	-	-	0	6/6
<b>Populus tremuloides</b>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
98	20	20	20	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-
<b>Quercus gambelii</b>												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
98	0	-	-	-	-	-	0	0	-	-	0	157/106
03	0	-	-	-	-	-	0	0	-	-	0	16/15
08	0	-	-	-	-	-	0	0	-	-	0	15/40

		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)	
<b>Ribes viscosissimum</b>													
82	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-	
92	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-	
98	<b>0</b>	-	-	-	-	-	0	0	-	-	0	31/31	
03	<b>0</b>	-	-	-	-	-	0	0	-	-	0	47/48	
08	<b>0</b>	-	-	-	-	-	0	0	-	-	0	39/40	
<b>Symphoricarpos oreophilus</b>													
82	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-	
92	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-	
98	<b>20</b>	-	-	20	-	-	100	0	-	-	0	25/51	
03	<b>60</b>	-	-	60	-	-	0	0	-	-	0	23/47	
08	<b>100</b>	-	40	60	-	-	0	0	-	-	0	22/48	