1976

Tucson Basin Validation Site Report

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1975 PROGRESS REPORT

TUCSON BASIN VALIDATION SITE REPORT

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US/IBP DESERT BIOME
RESEARCH MEMORANDUM 76-3

in

REPORTS OF 1975 PROGRESS
Volume 2: Validation Studies
Tucson Basin, 24 pp.

1975 Proposal No. 2.2.2.3

Printed 1976

Citation format: Author(s). 1976. Title.
US/IBP Desert Biome Res. Memo. 76-3.
Utah State Univ., Logan. 24 pp.

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ABSTRACT

Research activities during 1975 on the Silverbell bajada site generally followed the basic patterns established during 1972, 1973 and 1974. As in previous years, the four major areas of study were abiotic, plants, invertebrates and vertebrates. The meteorological telemetry system was operational during the first 42 weeks of the year; a breakdown occurred in mid-October which prevented further data acquisition in 1975. The parameters measured included air temperature, radiation, relative humidity, wind and soil temperature. Measured precipitation totaled 145.8 mm with 57.34% of the rainfall occurring during the summer and fall seasons. This figure represented a significant drought for the site and the growth of annual plants was severely restricted. The 1975 precipitation patterns were consistent with those observed in previous years, being characterized by high variability, but reflecting the basic winter-summer storm groupings that are common to the Tucson region. The lowest recorded air temperature (—6.5 C) occurred during the first week in January, while the highest temperature (50.2 C) was measured both during the last week in July and the second week in August. Radiation measurements indicated that the highest mean daily shortwave radiation influx (794.9 langleys) occurred during the fourth week in June; longwave radiation influx peaked during the first week of August with a mean daily value of 1054.0 langleys, while longwave efflux was greatest during the third week of July with a mean daily value of 1052.0 langleys.

Soil temperature was measured at three depths, both in an open area and in the shade of a creosotebush; the observed data indicated the presence of a temperature-buffering effect of the soil which restricted temperature extremes at the lower depths. Additionally, it was noted that increased soil depth produced a greater temperature differential between the shaded and uncovered sites, representing a lag effect for heat transfer through the soil.

The biotic components of the study included perennial plants, invertebrates, reptiles and small mammals. Five species of perennials were sampled during specified phenological periods. Biomass production was estimated as a function of the measured weights of branches, leaves, flowers and fruits obtained during each of the sampling periods. Litter production under four of the selected species was estimated through the use of litter traps. It was observed that flowering was severely restricted by drought conditions. Reptile trapping on the test site resulted in captures of an additional lizard species (*Crotaphytus wislizenii*) in 1975, which had only been observed in the previous year. Small mammal studies indicated a significant decrease in nocturnal rodent biomass, possibly reflecting the drought condition that prevailed. The zoological data were collected during the warm months of the year.

ACKNOWLEDGMENTS

Invertebrates	R. Mangan
Mammals	L. Cockrum C. Hoagstrom
Meteorology	L. Hekman J. Thames
Plants	J. Kramer D. Gilbert L. Hekman J. Thames
Reptiles	E. Arvizo
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INTRODUCTION

The research activities on the Silverbell Validation Site (Sec. 21, R9E, T11S) generally continued along the lines that had been established during 1972 through 1974. As in previous years, the objective was to periodically assess the inputs to, and states of, the major biotic and abiotic components of the Sonoran Desert system. Generally speaking, any deviations from previous years' activities consisted only of minor changes in methodologies and/or emphases, rather than alterations of basic programs.

The meteorological telemetry system failed after the 42nd week of 1975 (week of October 12) and various components experienced occasional down-time during the sampling period. The most notable of these was in the energy radiation sensing equipment, which was inoperative during the first 12 weeks of the year. Temperature and wind readings were the most trouble-free. The full array of abiotic measurements for 1975 is presented in this year's summary.

Soil moisture measurements were taken using psychrometers to estimate soil water potential and a neutron probe to determine accumulative soil moisture.

FINDINGS

ABIOTIC

Air Temperature

Air temperature was measured at three heights above the ground; 8 m, 2 m and 40 cm. Weekly summaries of hourly recordings at these heights are presented in Tables 1-3. The calendar weeks of 1975 designated the analysis time periods, with the first full week of 1975 (January 5-11) occurring as week 2 in the summaries. October 12-18 comprises week 42.

For each height, the summary data contain the following: week no.; minimum record (the lowest temperature recorded); maximum record (the highest temperature recorded); minimum daily mean (minimum among the computed daily mean temperatures); maximum daily mean (maximum among the computed daily mean temperatures); mean daily mean (mean of the seven daily average values); days utilized (number of data days included in the week's analysis -- if less than 7, system or sensor down-time is indicated).

Temperatures were recorded in degrees Celsius. The lowest temperature, —6.5 C, was recorded at 40 cm during the first week in January. Minimums, —4.2 and —1.9 C, were also recorded during the same week for the 2- and 8-m heights, respectively. The highest temperature, 50.2 C, was recorded at 40 cm during the weeks of July 27-August 2 and August 10-16. During the same weeks, temperatures of 41.5 and 50.2 C were recorded at a height of 2 m and 50.1 and 50.0 C at 8 m, respectively. The lowest daily and weekly means for the period measured all occurred during the first week of January. The hottest week of the year was that of August 24-30. Air temperature data are stored under DSCODE A3UTC50.

Radiation

Incoming shortwave solar radiation (Table 4), incoming longwave radiation (Table 5) and outgoing longwave radiation (Table 6) were sampled in 1975. Energy units are expressed in terms of langleys (1 cal/cm^2) per time unit. The summary table categories "week no." and "days utilized" are similar to their counterparts in the "Air Temperature" discussion above, as are the "minimum record" and "maximum record," except that the latter two are expressed in terms of langleys/minute. The "minimum-, maximum- and mean-daily total" divisions depict total langleys for a 24-hr period. Data are presented for the period beginning with the fourth week of March and extending through the second week of October.

The highest mean daily shortwave radiation influx, 794.9 langleys, was recorded during the fourth week of June, as was the highest minimum daily mean. The highest maximum daily mean was recorded during the third week of June. The lowest seven-day average daily incident shortwave radiation, during the period for which data are available, occurred during the first week of April.

The maxima for the incoming longwave radiation (minimum daily mean, maximum daily mean and seven-day average) all occurred during the first week of August. The value recorded for the highest mean daily longwave radiation influx was 1054.0 langleys.

The highest mean daily longwave radiation efflux (1052.0 langleys) and the highest minimum daily mean occurred during the third week of July. The highest maximum daily mean was recorded during the fourth week of June.

Precipitation

During 1975, the recorded precipitation on the site totaled 145.8 mm with 57.34% of the rainfall occurring during the summer and fall seasons. Precipitation amounts and dates of occurrence are shown in Table 7 (A3UTC52).

The total monthly precipitation patterns for the years 1972, 1973, 1974 and 1975 are depicted in the first four histograms of Figure 1. A fifth histogram presents monthly averages for the four years of record. Although great variability is evidenced in monthly patterns from year to year, the four-year averages reflect the basic summer-winter storm groupings that are common in the Tucson area.

Relative Humidity

Relative humidity was recorded during 1975 at a height of 8 m. Due to sensor deterioration, it is felt that high humidity readings reflect relative, rather than absolute, measurements. For this reason, all readings above 85% R.H. were reduced to 85% during summary compilation. Additionally, inherent sensor limitations precluded accurate readings when air temperatures dropped below 6 C. All measurements made under such conditions were excluded from the summary analysis (Table 8). Summary table column definitions are similar to those discussed above under "Air Temperature" (A3UTC50).

Wind

Wind speed and distance data from the Silverbell meteorological station for 1975 are summarized in Tables 9, 10 and 11 for heights of 8 m, 2 m and 40 cm, respectively. Wind passage was continuously monitored by the system and hourly recordings were made of total inter-interrogation activity.

The "week number" and "days utilized" columns have been described above in the "Air Temperature" section. "Minimum record" and "maximum record" are expressed in terms of kilometers per hour. The remaining three summary columns depict total wind distance in kilometers per day. Generally, the wind activity was greatest at the 8-m height and diminished with proximity to the ground surface. Of the 42 weeks sampled, the third week of June experienced the greatest wind activity, with mean daily total distances equal to 340.45, 188.84 and 137.00 km for the 8-m, 2-m and 40-cm heights, respectively.

Table 1. Air temperature at 8 m above ground

WEEK NO.	MIN. RECORD	MAX. RECORD	MIN. DAILY MEAN	MAX. DAILY MEAN	MEAN DAILY MEAN	DAYS UTILIZED
1	-1.90	16.10	4.10	6.60	5.23	4
2	.30	19.70	4.50	11.70	9.09	7
3	.50	22.90	7.00	14.30	11.46	7
4	1.10	24.30	9.00	15.30	12.09	7
5	2.00	26.80	8.10	18.40	11.47	7
6	2.20	21.60	9.40	18.00	12.58	6
7	2.90	22.60	10.30	14.90	13.27	7
8	-1.60	18.20	3.80	16.20	9.10	7
9	1.20	27.90	8.40	20.80	15.04	7
10	6.80	29.00	16.50	21.90	19.25	6
11	2.30	22.00	7.20	15.20	10.08	6
12	5.20	28.20	11.30	20.70	16.94	7
13	1.30	13.20	6.30	7.60	7.00	4
14	3.20	26.10	10.90	18.40	14.29	7
15	2.40	21.20	6.90	14.30	10.99	7
16	4.80	26.10	12.10	23.40	16.74	7
17	9.10	30.10	15.50	24.20	21.17	7
18	7.20	30.80	14.50	23.00	19.44	7
19	8.30	33.70	15.00	26.90	21.14	7
20	14.80	36.60	23.70	30.60	27.33	7
21	10.30	31.40	16.20	24.70	21.30	7
22	16.00	36.00	24.70	28.20	26.73	7
23	15.90	39.20	28.50	31.60	29.90	7
24	20.20	40.80	29.70	32.80	31.23	7
25	16.30	38.80	24.80	32.20	28.04	7
26	18.60	39.80	28.20	34.90	30.54	7
27	20.90	40.90	29.00	33.50	31.02	6
28	21.40	40.40	28.70	35.60	32.17	7
29	21.10	39.90	28.20	33.70	29.86	7
30	23.00	50.10	30.50	32.30	31.46	7
31	22.70	39.90	25.20	34.10	31.55	6
32	25.00	50.00	32.50	36.00	34.53	7
33	22.80	40.90	29.90	32.70	31.20	3
34	20.60	39.60	28.60	31.20	30.35	4
35	23.10	39.60	30.60	32.30	31.37	7
36	22.60	39.90	25.40	33.40	30.29	7
37	19.90	36.60	24.10	29.50	27.09	7
38	19.60	37.80	27.70	33.70	30.53	6
39	14.60	35.90	26.70	29.30	27.14	7
40	15.50	35.60	25.90	27.50	26.90	7
41	13.90	35.40	22.20	27.20	25.01	7
42	8.90	30.10	17.30	23.40	19.75	6

Table 3. Air temperature at 40 cm above ground

WEEK NO.	MIN. RECORD	MAX. RECORD	MIN. DAILY MEAN	MAX. DAILY MEAN	MEAN DAILY MEAN	DAYS UTILIZED
1	-6.50	18.60	2.80	5.20	3.80	4
2	-5.70	22.00	4.40	12.60	7.44	7
3	-6.40	26.40	5.80	10.90	8.64	7
4	-2.90	27.50	7.40	13.20	9.91	7
5	-1.50	29.80	6.60	18.50	10.83	7
6	-2.10	25.70	8.50	18.20	11.47	6
7	-2.90	25.70	10.20	13.50	12.03	7
8	-4.80	21.70	3.70	17.90	8.50	7
9	-6.00	31.00	6.20	19.70	12.89	7
10	2.00	32.80	15.80	20.40	17.55	6
11	-.10	23.60	7.70	17.30	10.67	6
12	.40	32.30	11.30	21.70	16.37	7
13	-2.40	16.80	6.10	8.20	7.38	4
14	-1.20	30.00	10.20	17.70	13.81	7
15	1.90	24.90	7.60	14.40	11.04	7
16	1.00	28.80	12.70	24.90	17.06	7
17	2.70	33.70	16.80	26.00	21.70	7
18	2.20	35.40	14.70	22.40	18.93	7
19	1.50	38.10	17.00	25.90	21.44	7
20	9.20	40.70	23.80	31.40	26.97	7
21	4.40	36.60	17.50	23.60	21.46	7
22	10.30	40.30	24.10	28.20	26.67	7
23	11.60	43.10	28.20	31.70	29.94	7
24	14.70	45.00	30.30	32.80	31.30	7
25	11.80	43.70	25.60	32.70	28.71	7
26	12.70	43.30	28.10	37.30	30.90	7
27	15.40	44.80	29.80	32.60	31.07	6
28	21.50	44.90	30.70	38.60	33.87	7
29	20.50	43.80	27.70	34.30	30.53	7
30	21.40	50.20	31.20	34.10	32.89	7
31	20.00	44.20	26.50	37.10	32.35	6
32	21.10	50.20	33.70	36.60	35.06	7
33	20.80	44.30	30.10	33.70	31.77	3
34	13.20	44.50	29.20	33.00	31.40	4
35	17.90	44.70	30.60	32.00	31.46	7
36	19.30	44.40	26.00	33.90	31.10	7
37	15.50	40.60	24.60	29.50	27.17	7
38	16.30	46.00	28.30	35.80	31.28	6
39	11.10	40.00	24.90	28.80	26.40	7
40	11.00	39.60	25.10	27.60	26.14	7
41	9.30	35.90	22.00	26.00	23.36	7
42	3.50	33.20	15.30	23.50	18.37	6

Table 2. Air temperature at 2 m above ground

WEEK NO.	MIN. RECORD	MAX. RECORD	MIN. DAILY MEAN	MAX. DAILY MEAN	MEAN DAILY MEAN	DAYS UTILIZED
1	-4.20	16.90	3.30	5.50	4.33	4
2	-2.90	20.40	3.70	11.70	7.80	7
3	-3.80	24.10	6.90	12.80	9.90	7
4	-1.30	25.40	8.10	13.90	10.80	7
5	.00	27.80	7.00	18.40	10.93	7
6	-.60	22.80	8.80	17.70	11.70	6
7	.10	24.40	10.60	13.70	12.41	7
8	-3.50	19.30	3.50	16.70	8.43	7
9	-2.60	28.90	7.00	19.70	13.54	7
10	3.90	30.40	16.50	20.40	18.17	6
11	.60	22.10	7.30	16.10	10.20	6
12	1.60	30.00	11.00	21.00	16.34	7
13	-1.30	14.50	5.90	7.70	6.95	4
14	1.10	27.30	10.20	17.70	13.74	7
15	2.40	22.40	7.10	13.90	10.77	7
16	2.20	26.90	12.20	24.00	16.54	7
17	4.00	31.60	15.90	24.80	21.06	7
18	4.40	32.00	14.20	22.10	18.74	7
19	3.90	35.30	15.90	25.90	20.96	7
20	10.60	38.00	23.40	30.70	26.77	7
21	6.60	33.20	16.60	23.40	20.96	7
22	12.40	37.60	24.00	28.00	26.33	7
23	13.00	40.60	28.10	31.40	29.64	7
24	16.60	42.20	29.90	32.50	30.99	7
25	12.70	40.80	25.00	32.30	28.17	7
26	14.70	41.20	27.80	35.60	30.34	7
27	17.80	42.20	29.20	32.60	30.80	6
28	21.30	42.10	29.90	37.10	32.89	7
29	20.30	41.50	27.70	33.80	29.97	7
30	21.60	41.50	30.60	33.00	31.80	7
31	21.90	41.10	25.40	35.00	31.53	6
32	22.90	50.20	32.80	35.70	34.49	7
33	21.80	40.90	29.80	32.90	31.27	3
34	18.80	41.30	28.60	31.40	30.58	4
35	20.30	40.90	30.40	31.70	31.10	7
36	21.00	41.30	25.50	32.80	30.47	7
37	17.00	38.10	24.20	29.30	26.91	7
38	17.50	39.70	27.70	34.70	30.75	6
39	12.40	37.20	25.40	28.70	26.53	7
40	12.60	37.20	25.30	27.20	26.23	7
41	11.00	36.90	21.90	26.10	24.10	7
42	5.00	31.20	15.90	23.30	18.77	6

Table 4. Incoming shortwave radiation (langleys)

WEEK NO.	MIN. RECORD (LY/MIN)	MAX. RECORD (LY/MIN)	MIN. DAILY TOTAL	MAX. DAILY TOTAL	MEAN DAILY TOTAL	DAYS UTILIZED
1			NO DATA			
2			NO DATA			
3			NO DATA			
4			NO DATA			
5			NO DATA			
6			NO DATA			
7			NO DATA			
8			NO DATA			
9			NO DATA			
10			NO DATA			
11			NO DATA			
12			NO DATA			
13	.00	1.50	51.5	667.2	359.4	2
14	.02	1.70	312.7	693.6	627.3	7
15	.00	1.70	289.5	646.2	442.1	7
16	.00	1.60	331.2	740.4	600.8	7
17	.00	1.60	629.0	754.8	692.9	7
18	.00	1.70	553.8	746.4	716.3	7
19	.00	1.60	279.9	779.3	662.8	7
20	.00	1.60	552.3	768.0	699.8	7
21	.00	1.70	700.2	787.2	755.8	7
22	.00	1.50	605.8	790.2	744.2	7
23	.00	1.60	537.3	805.2	745.0	7
24	.00	1.60	632.8	790.8	761.8	7
25	.00	1.70	618.3	800.4	753.2	7
26	.00	1.60	768.6	819.6	794.9	7
27	.00	1.60	361.5	781.5	620.4	6
28	.00	1.70	408.0	722.3	636.1	7
29	.00	1.70	233.6	653.5	513.0	7
30	.00	1.50	590.4	733.8	695.0	7
31	.00	1.70	387.6	753.9	626.9	6
32	.00	1.60	591.6	711.9	665.9	7
33	.00	1.70	472.3	538.6	545.8	3
34	.00	1.60	534.2	619.4	577.7	4
35	.00	1.50	517.0	667.5	620.8	7
36	.00	1.40	328.8	639.0	513.0	7
37	.00	1.60	259.5	629.4	583.8	7
38	.00	1.40	413.7	611.4	549.8	6
39	.00	1.40	539.8	625.5	579.9	7
40	.00	1.40	364.3	559.8	504.1	7
41	.00	1.30	505.5	553.3	536.2	7
42	.00	1.30	277.2	543.0	480.0	6

Table 5. Incoming longwave radiation (langleys)

WEEK NO.	MIN. RECORD (LY/MIN)	MAX. RECORD (LY/MIN)	MIN. DAILY TOTAL	MAX. DAILY TOTAL	MEAN DAILY TOTAL	DAYS UTILIZED
1			NO DATA			
2			NO DATA			
3			NO DATA			
4			NO DATA			
5			NO DATA			
6			NO DATA			
7			NO DATA			
8			NO DATA			
9			NO DATA			
10			NO DATA			
11			NO DATA			
12			NO DATA			
13	.36	.53	620.1	630.0	625.1	2
14	.36	.72	655.2	768.6	712.9	7
15	.41	.76	699.8	779.1	740.1	7
16	.41	.85	793.5	1032.0	872.1	7
17	.43	.83	841.3	1046.0	913.3	7
18	.43	.89	831.3	916.5	872.9	7
19	.42	.90	844.7	953.8	903.3	7
20	.17	.96	918.3	990.9	956.9	7
21	.45	.89	864.3	940.2	907.2	7
22	.48	.95	939.0	987.0	965.3	7
23	.49	.95	977.1	1017.0	994.1	7
24	.21	.97	985.8	1042.0	1010.7	7
25	.48	.95	936.7	1032.0	987.3	7
26	.49	.97	984.6	1139.0	1030.1	7
27	.51	.96	949.0	1035.0	999.1	6
28	.56	.99	1010.0	1065.0	1041.6	7
29	.56	.98	934.5	1043.0	989.4	7
30	.31	.95	998.4	1129.0	1032.8	7
31	.55	.96	960.0	1163.0	1042.8	6
32	.55	.98	1029.0	1080.0	1054.0	7
33	.33	.92	983.2	1009.0	998.4	3
34	.53	.98	967.0	1101.0	1012.1	4
35	.50	.94	965.7	1013.0	989.7	7
36	.53	.97	870.6	1080.0	979.2	7
37	.51	.92	865.8	969.5	926.9	7
38	.51	.94	953.3	1050.0	984.6	6
39	.46	.89	903.3	945.9	917.5	7
40	.48	.94	903.3	927.3	914.8	7
41	.46	.91	872.4	913.8	890.9	7
42	.41	.81	789.9	924.3	831.0	6

Table 7. Precipitation for 1975

Date	Amount (cm)
Jan 1	3.8
Jan 9	1.3
Feb 17	3.8
Mar 10	22.9
Mar 14	2.5
Mar 26	12.7
Apr 7	11.4
Apr 8	1.3
Apr 9	2.5
Jul 7	5.1
Jul 16	6.4
Jul 24	3.8
Jul 26	1.3
Aug 10	7.6
Aug 13	7.6
Aug 19	1.0
Aug 26	2.5
Sep 5	5.1; 5.8 *
Oct 21	7.6; 2.5 **
Nov 29	1.3; 3.8; 8.9 ***
Dec 14	1.8
Dec 20	1.3 ****
Dec 21	10.2

* 6 hr apart.
** 4 hr apart.
*** 3 hr and 2 hr apart, respectively.
**** one long event over 11 hr.

Table 6. Outgoing longwave radiation (langleys)

WEEK NO.	MIN. RECORD (LY/MIN)	MAX. RECORD (LY/MIN)	MIN. DAILY TOTAL	MAX. DAILY TOTAL	MEAN DAILY TOTAL	DAYS UTILIZED
1			NO DATA			
2			NO DATA			
3			NO DATA			
4			NO DATA			
5			NO DATA			
6			NO DATA			
7			NO DATA			
8			NO DATA			
9			NO DATA			
10			NO DATA			
11	.40	.62	709.5	710.8	710.2	2
12	.41	.74	736.1	837.9	788.6	7
13	.43	.70	698.1	800.1	743.4	7
14	.04	.73	762.3	923.6	833.2	7
15	.46	.79	834.3	1008.0	909.0	7
16	.46	.80	825.3	914.4	872.6	7
17	.44	.83	834.3	962.1	899.5	7
18	.19	.87	900.9	1023.0	966.5	7
19	.47	.80	846.9	934.2	899.3	7
20	.52	.85	943.5	992.1	967.6	7
21	.52	.87	992.4	1027.0	1004.7	7
22	.21	.89	1005.0	1045.0	1020.1	7
23	.53	.84	942.5	1037.0	986.4	7
24	.54	.88	990.2	1108.0	1025.0	7
25	.56	.86	976.6	1039.0	1011.3	6
26	.59	.85	991.0	1081.0	1035.6	7
27	.59	.85	944.5	1047.0	990.5	7
28	.31	.83	1000.0	1061.0	1017.3	7
29	.60	.84	968.1	1082.0	1025.5	6
30	.62	.88	1026.0	1066.0	1052.0	7
31	.31	.84	983.8	1005.0	996.6	3
32	.58	.85	970.0	1034.0	1002.7	4
33	.59	.82	990.3	1015.0	1004.5	7
34	.59	.92	915.3	1040.0	994.5	7
35	.56	.80	899.4	979.7	943.0	7
36	.57	.82	966.3	1049.0	998.2	6
37	.52	.78	934.2	976.5	946.3	7
38	.53	.81	929.1	944.7	940.1	7
39	.51	.78	888.6	937.5	914.9	7
40	.46	.72	807.5	922.5	847.5	6

Table 8. Percent relative humidity at 8 m

WEEK NO.	MIN. RECORD	MAX. RECORD	MIN. DAILY MEAN	MAX. DAILY MEAN	MEAN DAILY MEAN	DAYS UTILIZED
1	11.00	85.00	14.30	52.50	32.45	4
2	10.00	28.00	11.90	16.60	13.84	5
3	9.00	14.00	11.00	13.40	12.07	7
4	9.00	17.00	11.30	13.70	12.20	7
5	9.00	85.00	8.50	63.00	25.41	7
6	9.00	74.00	5.40	26.40	15.70	6
7	9.00	85.00	10.90	44.20	20.97	7
8	10.00	30.00	11.30	15.70	13.19	7
9	8.00	26.00	10.70	13.10	11.79	7
10	8.00	32.00	10.20	15.10	11.32	6
11	10.00	85.00	9.10	65.60	39.92	5
12	8.00	19.00	10.10	13.40	11.57	7
13	11.00	73.00	12.60	18.80	14.58	4
14	8.00	52.00	10.60	23.80	13.56	7
15	9.00	85.00	19.10	48.90	33.83	7
16	8.00	54.00	10.10	21.10	14.51	7
17	8.00	85.00	9.70	12.00	10.59	7
18	8.00	13.00	10.00	11.00	10.49	7
19	7.00	52.00	8.60	14.50	10.40	7
20	7.00	26.00	8.40	11.70	9.36	7
21	8.00	59.00	9.70	21.30	13.36	7
22	7.00	12.00	9.00	9.80	9.34	7
23	7.00	12.00	8.60	9.70	9.11	7
24	7.00	11.00	8.50	9.00	8.74	7
25	7.00	42.00	8.70	15.30	10.27	7
26	7.00	12.00	7.70	9.40	8.63	7
27	7.00	76.00	8.50	30.00	16.55	6
28	7.00	85.00	4.50	35.10	20.50	7
29	7.00	85.00	15.50	39.90	29.14	7
30	7.00	85.00	10.00	38.40	23.33	7
31	7.00	85.00	8.90	41.80	17.80	6
32	7.00	85.00	9.40	18.90	12.60	7
33	8.00	77.00	19.60	28.50	23.93	3
34	7.00	85.00	20.00	36.70	25.05	4
35	7.00	85.00	9.40	22.90	16.37	7
36	7.00	63.00	9.40	45.00	21.43	7
37	8.00	85.00	10.30	66.10	36.36	7
38	7.00	85.00	6.40	37.00	18.87	6
39	8.00	85.00	10.30	14.80	11.70	7
40	8.00	85.00	10.10	13.60	11.23	7
41	7.00	63.00	10.30	23.90	13.54	7
42	8.00	27.00	11.10	13.20	11.80	6

Table 9. Wind distance in kilometers at 8 m

WEEK NO.	MIN. RECORD (KM/HR)	MAX. RECORD (KM/HR)	MIN. DAILY TOTAL	MAX. DAILY TOTAL	MEAN DAILY TOTAL	DAYS UTILIZED
1	.32	22.53	154.01	246.39	201.61	4
2	.16	38.46	136.63	343.76	200.40	5
3	.16	31.54	153.53	465.42	216.36	7
4	.16	29.29	135.18	270.85	191.49	7
5	.16	42.65	98.49	528.19	239.31	7
6	.32	20.76	168.34	255.56	190.03	5
7	.00	30.90	157.55	436.94	242.18	7
8	.00	41.84	179.60	524.00	300.92	6
9	.32	70.81	167.37	303.20	213.79	7
10	.00	29.61	171.56	367.25	270.33	4
11	.16	52.63	103.48	803.06	327.82	6
12	.32		159.49	416.66	256.27	5
13	.16	37.34	160.61	366.13	240.19	4
14	.32	42.49	183.79	503.89	299.77	7
15	.00	34.28	146.77	438.06	253.13	7
16	.16	62.28	167.21	401.85	261.63	6
17	.00	28.81	157.07	421.00	280.62	7
18	.00	42.16	161.10	372.72	240.16	7
19	.16	31.54	187.81	457.54	297.21	5
20	.32	39.43	198.11	451.90	287.29	7
21	.16	53.27	198.59	580.01	297.18	7
22	.16	31.38	181.53	424.87	277.36	7
23	.16	27.04	232.39	294.51	261.13	7
24	.00	26.55	200.36	350.03	264.67	7
25	.00	45.38	212.27	455.28	340.45	7
26	.00		189.90	365.16	256.78	7
27	.00	43.13	212.43	349.55	255.30	6
28	.16	37.50	203.42	603.34	297.54	7
29	.00	29.13	101.87	245.42	192.27	7
30	.00	40.07	205.19	354.54	265.15	7
31	.16	23.98	180.41	247.36	221.19	5
32	.00		180.89	374.17	253.49	7
33	.00	25.59	199.08	263.45	220.80	3
34	.16	27.36	157.88	270.69	220.20	4
35	.00	29.29	154.18	262.16	218.34	7
36	.16	36.21	196.18	415.05	279.22	7
37	.00	31.54	158.20	376.75	237.72	7
38	.16	41.36	159.65	231.58	198.35	6
39	.32	35.89	154.18	506.46	300.72	7
40	.32	24.30	164.64	303.84	223.35	7
41	.16	35.57	168.82	432.91	261.98	7
42	.16	29.93	162.87	328.95	212.92	5

Table 11. Wind distance in kilometers at 40 cm

WEEK NO.	MIN. RECORD (KM/HR)	MAX. RECORD (KM/HR)	MIN. DAILY TOTAL	MAX. DAILY TOTAL	MEAN DAILY TOTAL	DAYS UTILIZED
1	.00	9.66	38.30	71.62	58.86	4
2	.00	14.97	40.88	129.39	65.21	5
3	.00	9.66	45.87	145.81	64.99	7
4	.00	42.33	42.33	87.07	63.82	7
5	.00	15.45	32.83	205.35	85.69	7
6	.00	8.53	51.18	95.60	63.44	5
7	.00	12.55	45.87	179.44	85.69	7
8	.00	16.42	51.50	186.20	101.79	6
9	.00	17.06	55.68	107.34	72.01	7
10	.00	14.00	59.87	147.58	104.89	4
11	.00	21.08	33.15	329.27	125.18	6
12	.00	43.45	43.45	168.98	91.60	5
13	.00	9.50	58.90	130.52	86.80	3
14	.00		69.52	213.56	136.17	7
15	.00	15.13	47.31	182.98	96.05	7
16	.00	26.72	60.03	159.81	99.97	6
17	.00	11.59	55.68	154.18	99.78	7
18	.00	11.43	45.22	142.59	85.09	7
19	.00	14.65	61.32	190.39	112.82	5
20	.00	14.81	66.30	182.34	100.54	7
21	.00	20.60	62.28	238.50	114.82	7
22	.00	11.59	67.43	166.41	107.53	7
23	.00	11.43	90.45	119.25	104.88	7
24	.00	9.66	74.35	134.86	104.35	7
25	.00	15.13	82.72	194.89	137.00	7
26	.00		64.53	186.84	109.62	7
27	.00	15.77	81.75	140.17	100.10	6
28	.00	18.83	84.33	246.71	130.22	7
29	.00	12.07	42.81	100.74	79.20	7
30	.00	12.23	86.58	148.70	112.42	7
31	.00	27.52	79.98	104.61	91.35	5
32	.00		79.50	254.44	130.43	7
33	.00	11.10	78.54	115.55	93.61	3
34	.00	11.27	65.66	124.24	97.85	4
35	.00	9.98	52.79	96.88	81.92	7
36	.00	17.38	73.23	196.18	128.77	7
37	.00	12.87	56.49	176.55	98.91	7
38	.00	12.87	58.10	116.19	79.58	6
39	.00	18.19	56.65	221.77	126.95	7
40	.00	12.71	56.65	136.31	86.21	7
41	.00	17.06	64.05	174.29	100.22	7
42	.00	13.52	54.23	134.86	90.21	5

Table 10. Wind distance in kilometers at 2 m

WEEK NO.	MIN. RECORD (KM/HR)	MAX. RECORD (KM/HR)	MIN. DAILY TOTAL	MAX. DAILY TOTAL	MEAN DAILY TOTAL	DAYS UTILIZED
1	.00	12.87	36.69	93.02	71.09	4
2	.00	21.73	33.15	188.29	79.15	5
3	.00	15.61	46.51	246.71	84.51	7
4	.00	14.31	38.30	120.54	80.10	7
5	.00	19.79	19.47	282.44	109.92	7
6	.00	12.87	53.43	129.71	76.32	5
7	.00	19.15	45.38	269.57	115.57	7
8	.00	26.55	55.20	297.08	143.71	6
9	.00	12.71	60.03	134.70	81.23	7
10	.00	20.44	68.08	212.92	137.00	4
11	.00	26.55	32.83	435.65	158.63	6
12	.00	58.26	49.57	254.28	127.52	5
13	.00	21.89	56.01	206.64	118.97	4
14	.00		79.18	234.05	184.34	7
15	.00	23.34	46.67	263.93	127.41	7
16	.00	41.52	53.91	258.46	145.11	6
17	.00	17.70	35.46	240.76	160.91	7
18	.00	18.19	74.19	219.19	134.91	7
19	.16	23.50	103.96	290.81	180.92	5
20	.16	20.60	119.74	244.46	161.44	7
21	.00	29.61	84.65	340.54	166.11	7
22	.00	19.15	88.03	244.62	157.30	7
23	.00	17.54	118.93	171.23	146.06	7
24	.00	14.65	95.11	186.36	141.74	7
25	.00	23.17	111.69	273.27	188.84	7
26	.00		87.07	278.58	159.65	7
27	.00	19.31	99.94	175.42	132.26	6
28	.00	26.23	108.95	345.37	162.93	7
29	.00	15.45	48.92	131.32	100.81	7
30	.00	17.22	97.20	212.43	142.66	7
31	.00	13.68	91.41	133.09	114.26	5
32	.00		99.62	354.70	173.23	7
33	.00	15.77	98.01	154.66	117.48	3
34	.00	14.65	70.33	139.21	115.03	4
35	.00	17.22	70.97	132.45	110.10	7
36	.00	22.37	102.68	239.15	151.19	7
37	.00	18.02	66.30	214.36	118.72	7
38	.00	26.23	67.43	120.86	98.68	6
39	.00	22.69	64.86	283.39	157.42	7
40	.00	16.09	82.72	173.17	114.22	7
41	.00	24.62	81.43	246.07	133.78	7
42	.00	19.31	64.37	188.94	101.23	5

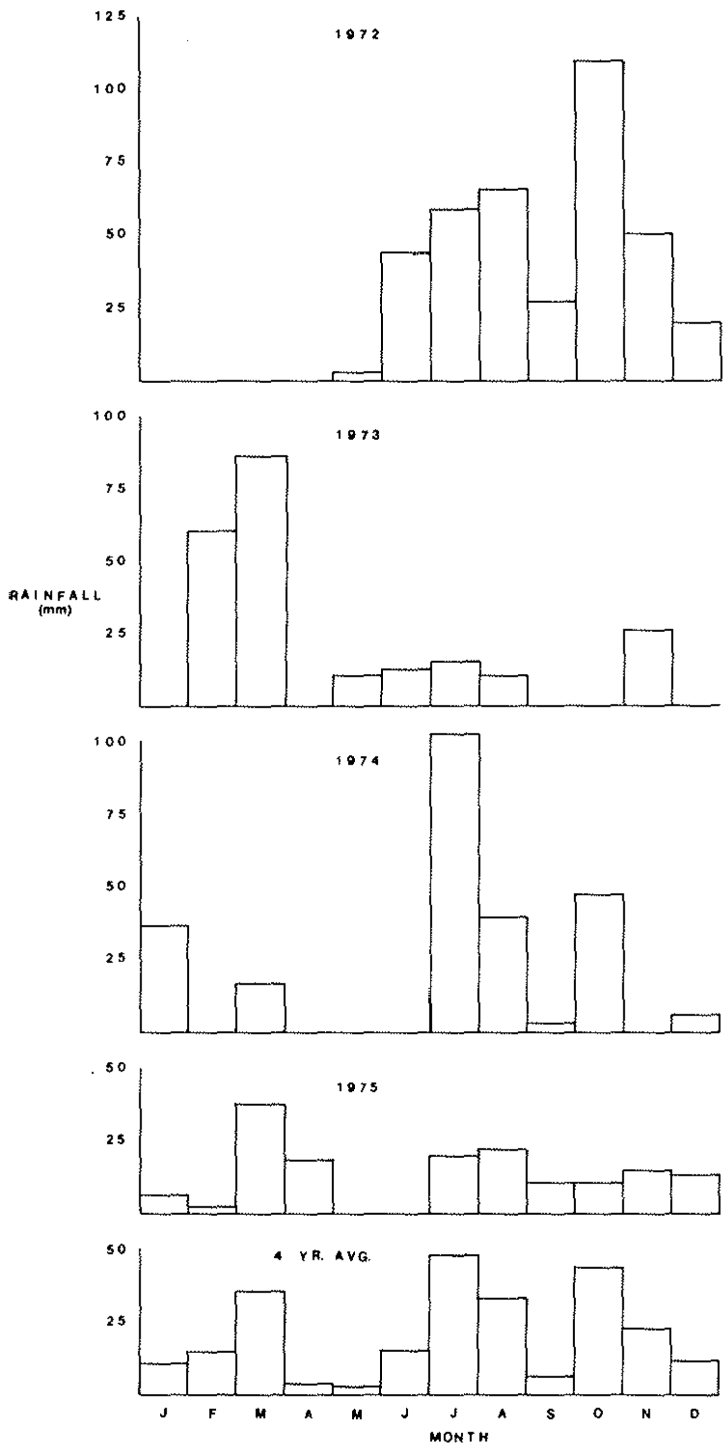

Figure 1. Monthly precipitation for 1972, 1973, 1974 and 1975 at Silverbell Validation Site.

Soil Temperature

Soil temperatures at three subsurface depths (5, 10 and 20 cm) were recorded in open space with no cover and under the cover of a creosotebush (*Larrea tridentata*). The weekly data summarized for these six sensors are presented in Tables 12 through 17. Column definitions are the same as those described in the previous section for "Air Temperature."

For both summer maxima and winter minima, temperature extremes were reduced as soil depth increased, indicating a buffering effect of the soil. It was also observed that increased soil depth produced a greater temperature differential between the shaded and uncovered sites for the maximum mean daily mean of the year, which occurred during the first week in August (week 32). This observation is probably due to a lag effect for heat transfer through the soil. The lowest temperatures were recorded during the first two weeks of the year, while the highest temperatures occurred during the third week of July at the 5-cm depth at each sensor site (A3UTC50).

Soil Moisture

Measurements of soil moisture content and soil moisture potential were continued at the validation site during 1975 (A3UTC53). Accumulative soil moisture to 90 cm was measured, using a neutron probe, under three vegetative cover conditions: no cover; creosotebush (*Larrea tridentata*); and bursage (*Ambrosia deltoidea*). The findings are presented in Table 18. Soil water potentials under these same vegetative conditions were measured at various depths using soil psychrometers and a psychrometric microvoltmeter. This instrument has a range from —0.5 to —50 bars, with an approximate accuracy of 0.5 bar. Potential measurements beyond this range are difficult to read and sometimes give similar responses on the meter. Soil moisture potential measurements for 1975 are given in Table 19. Tubac gravelly-sandy loam soil characterizes the sample area. A more detailed discussion of 1975 soil moisture studies at the Silverbell site is presented by Evans et al. (1976; A3UTC53).

Literature Cited

Evans, D. D., T. W. Sammis, and J. Ben Asher. 1976. Plant growth and water transfer interactive processes under desert conditions. US/IBP Desert Biome Res. Memo. 76-33. Utah State Univ., Logan. 14 pp.

Table 12. Soil temperature in the open at 5 cm

WEEK NO.	MIN. RECORD	MAX. RECORD	MIN. DAILY MEAN	MAX. DAILY MEAN	MEAN DAILY MEAN	DAYS UTILIZED
1	-.70	15.20	4.70	6.60	5.68	4
2	-.20	19.30	4.50	15.60	9.04	7
3	.60	21.50	7.90	11.70	9.84	7
4	3.50	23.50	10.60	12.80	11.81	7
5	4.00	25.70	10.50	18.00	13.20	7
6	4.70	25.80	12.10	19.30	14.27	6
7	5.10	26.00	14.20	15.60	14.87	7
8	1.40	23.80	9.50	20.20	12.49	7
9	.30	31.90	10.10	21.60	15.94	7
10	10.20	32.10	18.10	25.80	21.13	6
11	5.10	27.00	12.20	19.30	14.32	6
12	8.10	33.80	14.90	24.20	19.91	7
13	3.40	24.60	10.40	12.80	11.83	4
14	5.40	33.80	15.70	22.00	13.36	7
15	7.20	31.80	12.50	21.40	15.69	7
16	11.10	35.00	19.90	32.40	22.67	7
17	13.40	39.80	24.30	31.60	27.69	7
18	13.80	42.60	24.40	28.90	26.53	7
19	13.60	46.50	20.40	36.50	28.99	7
20	20.20	53.30	32.60	39.00	34.43	7
21	16.10	46.60	28.40	32.30	30.70	7
22	20.80	48.90	32.50	35.10	33.94	7
23	22.80	51.20	34.80	37.70	36.17	7
24	24.80	52.40	36.90	39.00	37.81	7
25	22.40	52.70	33.70	39.00	36.21	7
26	23.10	51.80	35.90	40.70	37.64	7
27	25.10	52.80	35.20	39.00	37.78	6
28	28.20	52.90	38.10	47.10	40.74	7
29	23.70	51.20	32.20	40.00	35.79	7
30	27.60	54.30	36.90	41.50	39.43	7
31	28.20	52.60	31.80	46.60	39.15	6
32	29.00	54.10	39.80	42.00	40.94	7
33	25.60	53.60	32.60	40.90	36.27	3
34	25.00	49.70	34.30	39.20	37.00	4
35	25.80	50.60	35.90	37.50	36.97	7
36	27.40	50.90	31.60	40.60	36.99	7
37	20.90	45.20	28.50	32.80	31.01	7
38	23.30	45.10	32.70	38.40	35.98	6
39	19.90	46.30	29.70	34.60	31.29	7
40	19.40	43.50	29.50	31.40	30.24	7
41	17.50	42.50	27.30	29.50	28.29	7
42	12.20	37.60	17.70	26.50	22.63	6

Table 13. Soil temperature in the open at 10 cm

WEEK NO.	MIN. RECORD	MAX. RECORD	MIN. DAILY MEAN	MAX. DAILY MEAN	MEAN DAILY MEAN	DAYS UTILIZED
1	.60	12.40	4.80	6.80	5.77	4
2	.90	16.20	4.80	13.60	8.56	7
3	2.20	18.20	7.80	11.20	9.46	7
4	5.20	19.10	10.40	12.20	11.41	7
5	5.20	22.20	10.20	16.80	12.73	7
6	6.10	21.60	11.60	17.50	13.45	6
7	7.30	21.50	13.80	15.10	14.40	7
8	3.50	19.80	9.60	17.00	11.89	7
9	2.30	27.20	9.70	19.90	15.09	7
10	11.50	27.20	17.50	25.10	20.15	6
11	6.30	24.50	11.90	16.80	13.55	6
12	9.40	30.00	15.60	23.20	19.23	7
13	4.80	20.90	10.30	12.20	11.43	4
14	6.70	29.60	14.70	20.90	17.44	7
15	8.00	27.70	12.40	20.60	15.11	7
16	11.90	31.60	18.80	30.10	21.23	7
17	14.60	34.90	22.80	28.90	25.80	7
18	15.40	36.20	23.30	26.90	24.99	7
19	15.60	39.60	18.80	32.90	26.90	7
20	21.60	52.40	30.60	35.60	32.17	7
21	18.00	40.10	26.70	30.20	28.89	7
22	23.00	43.50	31.60	33.70	32.59	7
23	25.80	45.50	34.30	36.50	35.30	7
24	27.70	47.30	35.90	38.20	36.93	7
25	25.40	47.40	33.60	38.30	35.77	7
26	26.00	46.60	35.10	38.10	36.47	7
27	28.20	47.50	35.20	38.10	37.27	6
28	30.30	48.40	37.70	43.40	39.64	7
29	25.20	46.50	32.70	39.00	35.59	7
30	29.50	56.30	36.50	40.40	38.57	7
31	29.40	47.70	31.30	43.30	37.90	6
32	31.30	50.20	39.10	41.10	40.14	7
33	28.20	57.10	33.60	40.50	36.40	3
34	26.40	44.20	33.20	36.30	35.30	4
35	27.60	45.40	35.00	36.60	36.06	7
36	29.30	45.80	32.00	38.00	36.14	7
37	23.10	42.90	29.10	32.80	31.04	7
38	24.80	59.60	32.30	58.20	42.00	6
39	22.90	44.60	30.20	37.40	32.31	7
40	22.50	39.50	30.00	32.20	30.94	7
41	20.70	38.70	28.00	30.00	28.80	7
42	15.30	34.40	19.70	27.20	23.15	6

Table 14. Soil temperature in the open at 20 cm

WEEK NO.	MIN. RECORD	MAX. RECORD	MIN. DAILY MEAN	MAX. DAILY MEAN	MEAN DAILY MEAN	DAYS UTILIZED
1	4.10	10.30	6.90	8.90	7.78	4
2	4.60	13.50	6.50	11.90	9.39	7
3	6.40	15.40	9.40	12.10	10.60	7
4	8.90	16.40	11.90	12.90	12.54	7
5	8.80	19.40	11.70	16.70	13.84	7
6	9.50	18.50	12.70	15.30	13.87	6
7	11.50	18.60	15.00	16.10	15.41	7
8	8.20	16.60	11.50	14.30	12.86	7
9	6.30	22.20	11.10	18.70	15.43	7
10	15.60	23.60	18.70	23.20	20.20	6
11	9.50	27.80	11.90	16.90	14.70	6
12	12.60	27.30	17.20	23.30	19.61	7
13	8.40	18.20	12.50	15.70	13.55	4
14	10.30	26.30	15.30	21.50	18.19	7
15	11.30	25.40	14.50	21.80	16.66	7
16	14.80	28.70	19.30	27.90	21.70	7
17	18.00	31.60	23.30	28.10	26.06	7
18	20.10	32.10	24.50	27.50	25.89	7
19	21.00	34.70	22.10	30.00	27.27	7
20	26.00	51.60	30.60	33.70	32.14	7
21	22.60	34.60	27.00	30.50	29.09	7
22	25.70	36.60	30.40	32.30	31.37	7
23	29.10	38.70	33.40	34.60	33.96	7
24	30.50	40.70	34.20	36.70	35.40	7
25	29.30	40.70	33.40	37.00	35.07	7
26	29.70	40.10	34.00	35.20	34.86	7
27	31.60	40.80	35.10	37.30	36.27	6
28	33.30	57.10	37.40	39.20	38.50	7
29	28.80	42.00	32.70	38.00	35.94	7
30	30.30	51.80	36.20	39.40	37.74	7
31	26.40	49.20	33.50	40.00	37.95	6
32	35.10	50.10	38.60	39.90	39.34	7
33	6.40	52.80	34.80	37.80	36.10	3
34	30.90	40.50	34.40	37.10	35.62	4
35	32.10	41.10	36.10	37.10	36.79	7
36	32.10	55.00	33.42	37.80	36.41	7
37	26.40	59.80	31.40	33.40	32.60	7
38	23.30	42.10	32.30	36.00	34.75	6
39	25.70	39.70	30.50	35.00	32.06	7
40	25.30	34.00	29.30	30.80	30.10	7
41	24.00	32.70	27.50	29.30	28.31	7
42	19.40	29.90	21.30	27.30	23.97	6

Table 15. Soil temperature under cover at 5 cm

WEEK NO.	MIN. RECORD	MAX. RECORD	MIN. DAILY MEAN	MAX. DAILY MEAN	MEAN DAILY MEAN	DAYS UTILIZED
1	-1.00	11.70	3.00	6.10	4.32	4
2	-.50	15.70	4.50	11.60	7.26	7
3	.90	17.70	6.40	9.70	8.00	7
4	3.80	19.40	9.10	10.60	9.96	7
5	4.50	21.90	9.70	16.00	11.30	7
6	4.80	21.50	10.30	16.70	12.10	6
7	5.40	21.70	12.40	14.10	13.14	7
8	1.60	19.10	7.80	15.90	10.17	7
9	.20	26.50	7.90	18.30	13.49	7
10	9.60	27.70	16.60	24.00	19.05	6
11	5.10	22.80	9.80	15.20	11.70	6
12	7.70	29.00	14.00	21.70	17.50	7
13	3.60	20.00	9.40	10.60	10.03	4
14	5.40	28.70	13.20	19.30	15.93	7
15	6.70	26.60	11.00	18.70	13.67	7
16	10.20	30.60	17.50	23.80	19.69	7
17	12.70	34.60	21.30	27.30	24.29	7
18	13.00	37.40	21.60	25.90	23.60	7
19	13.00	40.60	17.00	33.60	25.94	7
20	19.00	51.70	29.50	35.00	31.04	7
21	15.50	41.50	25.00	29.10	27.54	7
22	20.60	45.20	30.90	33.00	31.80	7
23	23.40	47.20	34.00	36.00	34.67	7
24	25.40	48.80	35.30	37.40	36.21	7
25	23.00	49.10	32.40	37.50	34.73	7
26	23.70	48.20	34.40	37.80	35.79	7
27	25.90	48.80	34.30	37.00	36.23	6
28	28.20	51.30	36.20	42.70	38.44	7
29	23.90	47.30	31.20	38.00	34.01	7
30	27.70	53.80	35.00	39.10	37.14	7
31	3.80	48.60	31.70	43.40	37.15	6
32	29.30	51.20	38.30	40.50	39.44	7
33	26.10	54.10	31.50	39.20	34.87	3
34	24.70	43.60	31.70	34.60	33.78	4
35	25.70	46.10	33.30	35.10	34.41	7
36	27.00	46.50	31.30	37.00	35.00	7
37	21.20	42.40	27.90	30.90	29.44	7
38	22.70	43.20	30.80	34.50	33.23	6
39	20.20	40.90	28.30	32.00	29.67	7
40	20.00	38.60	28.10	29.90	28.80	7
41	17.80	37.90	25.90	27.90	26.69	7
42	12.70	33.10	17.50	25.00	20.70	6

Table 16. Soil temperature under cover at 10 cm

WEEK NO.	MIN. RECORD	MAX. RECORD	MIN. DAILY MEAN	MAX. DAILY MEAN	MEAN DAILY MEAN	DAYS UTILIZED
1	2.60	9.40	5.10	7.60	6.18	4
2	3.10	12.80	4.60	10.30	7.81	7
3	4.40	14.40	7.90	10.60	9.13	7
4	7.30	15.80	10.40	11.40	11.04	7
5	7.90	18.50	10.90	15.70	12.64	7
6	8.10	17.80	11.30	14.40	12.43	6
7	9.40	17.90	13.30	14.70	13.90	7
8	5.90	15.50	9.50	13.40	11.01	7
9	4.80	21.30	9.20	17.00	13.67	7
10	13.10	22.90	17.20	21.80	18.63	6
11	7.40	24.90	10.00	15.20	12.73	6
12	10.50	26.00	14.10	21.50	17.29	7
13	6.80	17.00	10.90	13.10	11.58	4
14	8.20	25.00	13.50	19.40	16.29	7
15	9.40	23.50	12.80	19.30	14.70	7
16	12.50	27.00	17.30	25.90	19.49	7
17	15.80	30.00	21.20	25.80	23.74	7
18	17.10	31.20	22.00	25.20	23.46	7
19	17.80	33.90	19.00	28.30	25.06	7
20	22.90	50.20	28.40	31.90	29.87	7
21	20.20	34.80	25.30	28.50	27.39	7
22	23.70	38.10	29.70	31.70	30.83	7
23	27.50	40.30	33.30	34.50	33.66	7
24	29.30	42.10	34.20	36.30	35.10	7
25	27.30	42.20	32.70	36.50	34.37	7
26	27.80	41.60	33.60	35.30	34.59	7
27	30.10	42.20	34.50	36.50	35.70	6
28	31.50	44.10	36.00	38.80	37.34	7
29	27.20	41.90	31.50	36.90	34.26	7
30	30.80	55.90	34.90	38.20	36.46	7
31	24.70	42.60	29.70	38.70	35.70	6
32	32.50	49.80	37.40	39.40	38.51	7
33	29.80	56.90	33.40	38.90	35.40	3
34	27.80	39.00	31.90	34.40	33.18	4
35	29.00	40.20	33.30	34.60	34.13	7
36	30.50	40.40	32.30	35.60	34.56	7
37	24.80	41.30	28.90	31.20	30.20	7
38	26.20	38.30	30.80	33.70	32.82	6
39	24.50	36.60	28.90	32.40	30.24	7
40	24.20	34.00	28.60	29.90	29.16	7
41	22.20	33.10	26.60	28.50	27.40	7
42	17.60	30.00	21.00	26.20	22.68	6

Table 17. Soil temperature under cover at 20 cm

WEEK NO.	MIN. RECORD	MAX. RECORD	MIN. DAILY MEAN	MAX. DAILY MEAN	MEAN DAILY MEAN	DAYS UTILIZED
1	5.50	9.70	6.90	9.10	7.88	4
2	5.50	11.40	7.00	9.80	8.73	7
3	7.20	13.00	9.00	11.20	9.99	7
4	9.60	13.90	11.40	12.10	11.76	7
5	10.40	16.80	12.00	15.10	13.30	7
6	10.50	31.60	12.00	20.90	14.13	6
7	12.10	16.80	14.00	16.00	14.74	7
8	9.40	14.90	11.00	13.70	12.10	7
9	8.00	18.20	10.30	16.20	13.74	7
10	15.30	20.20	17.40	18.90	18.08	6
11	12.20	32.80	12.80	17.90	15.68	6
12	12.80	23.80	15.60	21.10	17.43	7
13	9.70	17.70	12.30	17.00	13.68	4
14	11.00	22.70	14.00	19.60	16.69	7
15	12.70	21.90	14.60	20.00	16.83	7
16	15.50	24.80	17.90	23.40	19.73	7
17	18.10	27.20	21.10	24.90	23.41	7
18	20.00	27.90	22.50	25.00	23.60	7
19	21.00	29.90	21.80	26.90	24.74	7
20	25.00	58.10	27.50	30.00	29.09	7
21	23.20	33.00	25.50	30.00	27.47	7
22	25.70	33.30	28.40	30.30	29.66	7
23	29.00	35.30	31.50	32.70	32.33	7
24	30.70	37.40	32.80	34.80	33.70	7
25	29.60	52.00	32.20	36.50	33.89	7
26	3.60	37.10	32.40	33.70	33.29	7
27	32.20	37.40	34.50	35.70	34.92	6
28	34.40	39.10	36.30	37.10	36.70	7
29	29.80	38.60	31.90	36.50	34.54	7
30	32.20	57.20	34.20	37.20	35.70	7
31	26.00	38.40	30.70	36.00	34.68	6
32	34.10	50.10	36.30	38.10	37.39	7
33	31.90	58.40	33.70	38.30	35.57	3
34	30.10	35.90	32.10	34.10	32.93	4
35	31.30	36.40	33.30	34.10	33.77	7
36	31.80	36.80	32.80	34.70	34.04	7
37	27.20	42.60	29.50	31.30	30.61	7
38	28.50	35.10	30.70	33.20	32.32	6
39	27.10	34.40	29.20	32.50	30.53	7
40	26.80	31.20	28.80	29.60	29.20	7
41	25.10	30.50	27.00	28.70	27.73	7
42	15.70	28.50	22.10	26.80	23.95	6

Table 18. Soil moisture content and variability in bare soil under creosotebush (*Larrea tridentata*) and under bursage (*Ambrosia deltoidea*)

	No Cover				*Larrea tridentata*				*Ambrosia deltoidea*			
	$\bar{D}_T^*$				$\bar{D}_T$				$\bar{D}_T$			
Date	moisture	S**	Sample size	ΔD***	moisture	S	Sample size	ΔD	moisture to 90 cm	S	Sample size	ΔD
11-21-74	6.31	.86	10	--	6.56	2.15	3	--	6.37	.08	3	--
1-18-75	6.91	1.36	10	+.60	6.72	.85	3	+.15	6.73	.22	3	+.34
2-15-75	5.44	.58	10	-1.49	5.53	.22	3	-1.19	5.43	.32	3	-1.30
3-14-75	5.61	.52	10	+.17	5.54	.22	3	+.01	5.27	.48	3	- .15
4-5-75	8.36	1.70	10	+2.74	8.88	2.01	3	+3.34	7.07	.78	3	+1.80
5-14-75	6.83	.82	10	-1.53	7.55	.53	3	-1.33	7.08	.28	3	+ .01
7-9-75	5.71	.25	10	-1.12	5.63	.13	3	-1.92	5.74	.16	3	-1.35
8-14-75	5.13	.13	10	- .58	5.42	.39	3	- .21	5.00	.48	3	- .77
9-20-75	6.24	.44	10	+1.10	6.38	.57	3	+ .97	6.23	.33	3	+1.23
10-20-75	5.61	.41	10	- .69	5.26	.38	3	-1.12	5.56	.49	3	- .67
11-7-75	--	--	--	--	8.91	.39		+3.65	9.55	.59		+3.99

* $\bar{D}_T$ = mean total soil moisture, to 90 cm, in cm. $\bar{D}_T = \int_0^z \Theta dz$ Θ = moisture content $\frac{cm^3}{cm^3}$.

** S = standard deviation.

*** ΔD = change in total moisture content from the previous time period, in cm.

Table 19. Soil moisture potential (—bars) at selected depths in plot 1

	No Cover					*Larrea tridentata*					*Ambrosia deltoidea*		
Date	5 cm	10 cm	20 cm	40 cm	60 cm	5 cm	10 cm	20 cm	40 cm	60 cm	15 cm	30 cm	60 cm
1-3-75	.24	.29	2.90		22.67	5.54	<.20	<.20	<.20	<.20	<.20	2.62	<.20
2-22-75	<.20	42.16	6.84	10.09	15.71	8.84		4.91	21.48	2.28	11.12	5.77	20.77
3-23-75	<.20	42.19	8.12	8.61	15.44	11.60		6.17	31.11	2.29	8.65	6.33	19.17
4-5-75	.20	50.07	11.96	25.50	8.56	13.34		3.89	21.41	<.20	12.97	18.11	38.34
4-22-75	4.67	5.15	20.36	20.19	<.20	10.13		31.50	19.98	<.20	29.16	19.98	35.46
11-7-75	21.9	17.0	16.6	20.2		16.4	15.7	10.3					

PLANTS

Perennials

Biomass Production

An experiment was designed to measure the biomass production of perennial plants as a function of the phenological periods peculiar to each of the test species. Biomass production was measured as a function of terminal branch growth and weight gain of branches, leaves, flowers and fruits (A3UTC38).

Whitethorn acacia (*Acacia constricta*), triangular leaf bursage (*Ambrosia deltoidea*), creosotebush (*Larrea tridentata*), paloverde (*Cercidium microphyllum*) and ironwood (*Olneya tesota*) plants were randomly selected from a 20-m-wide transect that ran perpendicularly to the ridges and dry stream beds of the untreated site. With the exception of *Ambrosia*, 30 plants of each species were used, of which five branches from each plant were tagged with a number ranging from 1-150. At the time of tagging, the terminal ends of each branch were marked at a point 20 cm from the tip. Random numbers from 1-150 were generated on a computer and divided into five sets of 30 each. Each of the sets was then designated for a particular sampling period.

The sampling periods were selected independently for each species so as to represent five increments of phenological development. They were designated as follows: DM 1, a period of relative dormancy early in the year which was chosen to provide a baseline for biomass production during the subsequent periods; DM 2, a time selected to sample midspring growth prior to flowering; FLR and FRT, time intervals chosen to represent the peaks of the flowering and fruiting periods, respectively; and DM 3, a dormant period in the late fall. Samples were usually collected over a period of a week or more, rather than on a single day.

During each sampling period, one set of tagged branches was selected, clipped and placed in paper bags for transport to the laboratory. *Olneya* and *Cercidium* were cut at the 2.5-cm diameter, while *Acacia* and *Larrea* were cut at the 1.25-cm diameter. In the case of *Ambrosia*, 30 plants were selected at random during each sampling period and the entire bush was cut of at ground level. In some instances, the actual number of plants/branches sampled in a given period deviated slightly from the prescribed number of 30, as may be seen in the data table.

In the laboratory, the leaves, dead branches, fruits and flowers were removed from the sample branches by hand-picking; the terminal ends were cut off at the point marked and then measured. The removed leaves, fruits and flowers for each sample were oven-dried for 24 hr at 83 C and weighed. The remaining branch material was air-dried in the laboratory for periods of 2-8 weeks before weighing. The terminal end weights were added to the respective branch weights to obtain the quantity designated as "live branch" weight. Samples under 160 g were weighed to the nearest milligram; those between 160 and 800 g were weighed to the nearest centigram; and larger samples were weighed to the nearest gram.

The results of the raw data analysis are summarized in Table 20. The number of branches/plants sampled (n) for each species in the respective sampling periods may be seen in the column so designated. The value n_s represents the actual number of branches in the sample which contributed leaves, flowers, fruits, etc. to the measured sample: e.g., for *Acacia* in the DM 1 period, of the 29 (n) branches sampled, only 22 (n_s) contributed dead branch material, three contributed leaves and none bore flowers or fruits. The values for the mean, standard deviation and 95% confidence interval were computed using the sample value (n) rather than n_s in all instances except for statistics on the weights and lengths of the terminal ends of the branches; in the latter case n_s was used. The data for each species from Table 20 are plotted in Figures 2-6.

Litter Production

During spring and summer of 1974, four large, open-topped, "inverted-tent" litter traps were constructed encircling two *Olneya* trees and two *Cercidium* trees on the Silverbell site; one tree per trap. These traps consist of mosquito netting sewn over a supporting framework of electrical conduit. Six additional small traps -- three each for *Larrea* and *Acacia* -- were constructed during the 1974-75 winter. Monthly accumulations of litter are removed by vacuuming, separated into stems, leaves, flowers and fruit components, dried (48 hr at 80 C) and weighed in the laboratory. The mean weights (g) of the contents are shown in Table 21 (A3UTC35).

Table 20. Statistical analysis of plant part weights (g) and lengths (cm)

PLANT/PERIOD	#BRANCHES/ PLANTS SAMPLED		LIVE BRANCH	DEAD BRANCH	LEAVES	FLOWERS	FRUITS	TERM END(WT)	TERM END(LENGTH)
AMBROSIA									
DM 1	30	n_s	30	29	30	-	28	-	-
2/22		$\bar{x}$	53.20	176.32	23.81		0.58		
		s	35.06	146.23	12.38		0.74		
		95%CL	13.09	54.60	4.62		0.28		
FLR	29	n_s	29	29	29	-	27	-	-
5/14-30		$\bar{x}$	64.42	149.13	24.20		0.29		
		s	39.78	97.58	14.05		0.40		
		95%CL	15.13	37.12	5.34		0.15		
FRT	30	n_s	30	30	30	-	29	-	-
6/24 - 7/2		$\bar{x}$	87.15	60.44	17.23		0.26		
		s	66.82	46.09	8.44		0.25		
		95%CL	24.95	17.21	3.30		0.09		

Table 20, continued

PLANT/PERIOD	# BRANCHES/ PLANTS SAMPLED		LIVE BRANCH	DEAD BRANCH	LEAVES	FLOWERS	FRUITS	TERM END(WT)	TERM END(LENGTH)
DM 3	30	n_s	24	26	27	-	3	-	-
11/18		$\bar{x}$	65.66	111.08	4.84		0.0045		
		s	102.48	88.78	3.75		0.014		
		95%CL	38.27	33.15	1.40		0.0053		
<u>OLNEYA</u>									
DM 1	29	n_s	29	28	28	-	-	29	29
3/14-21		$\bar{x}$	271.12	36.72	1.80			1.53	18.77
		s	128.69	42.02	1.81			1.87	2.67
		95%CL	48.95	15.98	0.69			0.71	1.02
DM 2	30	n_s	28	22	24	-	-	29	29
5/7		$\bar{x}$	285.60	16.28	4.01			1.14	17.69
		s	146.47	21.56	4.12			0.63	3.84
		95%CL	54.69	8.05	1.54			0.24	1.46
<u>CERCIDIUM</u>									
DM 1	31	n_s	31	31	5	-	-	31	31
3/21-4/3		$\bar{x}$	464.75	55.89	1.03			1.25	19.28
		s	225.47	41.06	3.93			0.77	3.19
		95%CL	82.70	15.06	1.44			0.28	1.17
DM 2	27	n_s	27	27	4	-	-	26	26
4/25 - 5/7		$\bar{x}$	538.98	55.61	0.76			1.33	19.89
		s	181.40	38.46	1.99			1.10	0.69
		95%CL	71.76	15.21	0.79			0.44	0.28
FLR	19	n	18	16	1	-	-	15	15
6/13 - 9/16		$\bar{x}^s$	334.07	55.77	0.046			1.68	19.42
		s	226.14	36.33	0.20			2.27	1.86
		95%CL	109.00	17.51	0.10			1.26	1.03
FRT	34	n_s	34	34	17	-	-	33	33
11/6-20		$\bar{x}$	379.23	73.05	2.80			1.11	18.94
		s	159.61	73.71	4.73			0.67	1.76
		95%CL	55.69	25.72	1.65			0.24	0.62
DM 3	32	n_s	32	31	21	-	-	28	29
12/22		$\bar{x}$	390.21	60.77	1.53			1.65	19.07
		s	175.43	36.05	2.27			1.97	1.68
		95%CL	63.25	13.00	0.82			0.77	0.64
<u>ACACIA</u>									
DM 1	29	n_s	29	22	3	-	-	29	29
2/18-25		$\bar{x}$	184.10	11.90	0.010			0.84	20.05
		s	88.46	27.46	0.037			0.74	1.59
		95%CL	33.65	10.45	0.014			0.28	0.61
DM 2	32	n_s	29	9	-	-	1	32	32
4/15		$\bar{x}$	179.30	8.68			0.007	0.95	18.95
		s	122.66	17.49			0.039	0.75	3.16
		95%CL	44.22	6.30			0.014	0.27	1.14
FLR	29	n_s	29	15	26	5	8	29	28
6/6-13		$\bar{x}$	180.88	4.70	10.29	0.14	0.37	0.69	20.21
		s	110.27	10.64	21.92	0.46	0.81	0.37	3.07
		95%CL	41.94	4.05	8.34	0.17	0.31	0.14	1.19
FRT	28	n_s	28	15	17	-	-	27	27
8/20 (estimated)		$\bar{x}$	133.31	2.34	1.53			1.10	20.33
		s	47.72	4.35	4.12			1.24	0.41
		95%CL	18.50	1.69	1.60			0.49	0.16
DM 3	27	n_s	27	13	18	-	-	26	26
1/6/1976		$\bar{x}$	132.05	2.69	1.23			1.01	18.85
		s	45.13	6.02	1.73			0.40	5.05
		95%CL	17.85	2.38	0.68			0.16	2.04
<u>LARREA</u>									
DM 1	29	n_s	29	29	29	-	-	28	28
3/7-14		$\bar{x}$	103.12	4.79	6.14			1.74	20.25
		s	46.66	4.46	3.30			1.45	2.88
		95%CL	17.75	1.67	1.25			0.56	1.12
DM 2	28	n	28	8	27	-	17	28	27
4/15		$\bar{x}^s$	117.97	2.09	16.21		0.11	2.26	16.25
		s	47.74	4.16	9.97		0.17	2.85	4.53
		95%CL	18.51	1.61	3.87		0.07	1.10	1.79
FLR	37	n	37	20	36	1	35	37	37
5/13-30		$\bar{x}^s$	117.74	2.09	9.10	0.62	1.47	1.41	19.06
		s	58.28	3.56	5.09	3.76	1.48	0.87	3.00
		95%CL	19.43	1.19	1.70	1.25	0.49	0.29	1.33
FRT	20	n_s	20	18	20	-	17	19	19
6/13-24		$\bar{x}$	96.89	10.38	30.59		1.06	1.55	19.93
		s	76.33	28.49	88.60		0.87	0.83	2.55
		95%CL	35.72	13.33	41.46		0.41	0.40	1.23
DM 3	34	n	34	29	32	7	12	34	34
12/4		$\bar{x}^s$	98.27	2.34	4.14	0.02	0.10	1.70	21.71
		s	49.23	2.38	3.19	0.06	0.23	1.40	1.92
		95%CL	17.18	0.83	1.11	0.02	0.08	0.49	0.67

Table 21. Mean weights of litter trap contents (g)

Month	Species	Stems	Leaves	Flowers	Fruit
2/4/75	Cerc	130.724	263.059		
	Olneya	88.476	664.527		
	Acacia	2.800	2.223	.170	1.773
4/8/75	Cerc		15.338		
	Olneya	127.115	179.733		.184
	Acacia	11.635	.319		.041
	Larrea	226.304	7.66		.047
5/9/75	Cerc	22.536	26.762		.011
	Olneya	30.264	82.128		.068
	Acacia	2.526			
	Larrea	6.292	5.397		.030
6/5/75	Cerc	23.593		239.586	.227
	Olneya	77.005	67.705		
	Acacia	1.086	3.576		.137
	Larrea	9.944	31.899		
7/11/75	Cerc	25.298	6.846		3.192
	Olneya	85.061	23.345		.586
	Acacia	3.192	4.262		.004
	Larrea	18.963	10.752		.277
8/22/75	Cerc	512.405	.018		6.025
	Olneya	86.057	97.245		3.399
	Acacia	6.035	2.115		.699
	Larrea	5.104	6.369		.196
9/18/75	Cerc	32.754	.921		.189
	Olneya	62.297	113.391		
	Acacia	34.843	3.639		.202
	Larrea	24.779	1.926		.014
10/18/75	Cerc	75.282	.206		
	Olneya	27.711	57.557		
	Acacia	7.706	2.866		.119
	Larrea	7.439	1.515		
11/25/75	Cerc	9.414	1.699		.098
	Olneya	57.205	73.588		
	Acacia	.189	5.314		
	Larrea	8.281	3.707		
1/6/76	Cerc	16.571	.054		.004
	Olneya	19.936	33.742		.139
	Acacia	19.200	3.907		.007
	Larrea	9.637	3.346		

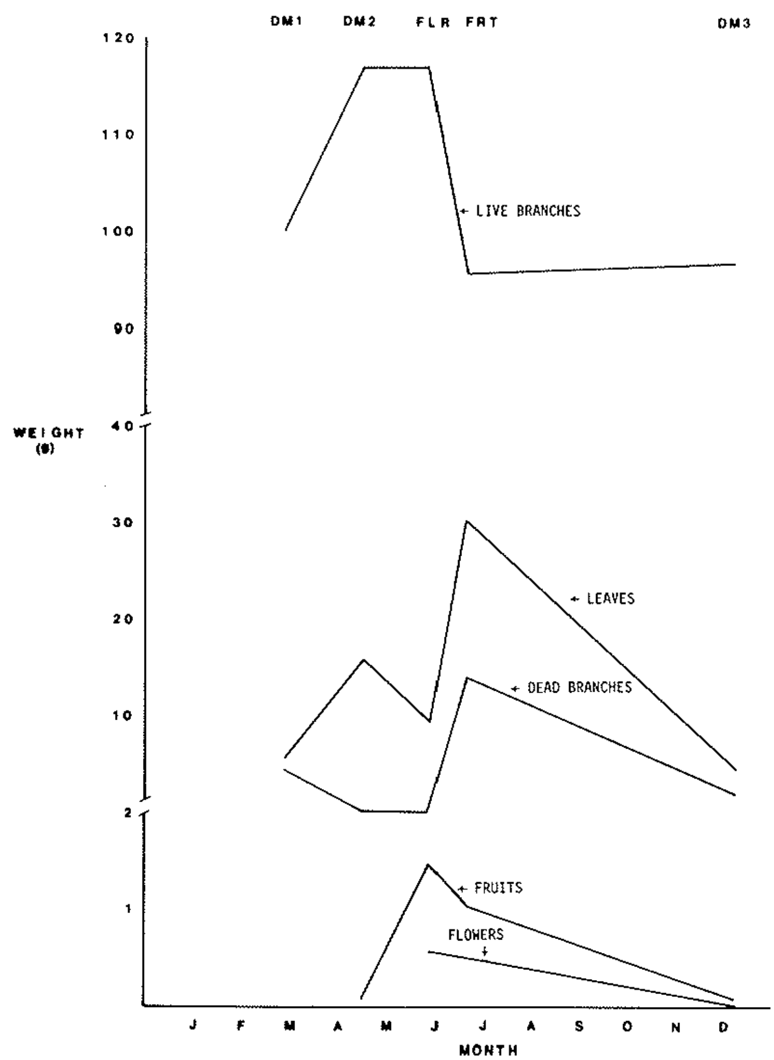

Figure 2. *Larrea tridentata* component weights vs. time.

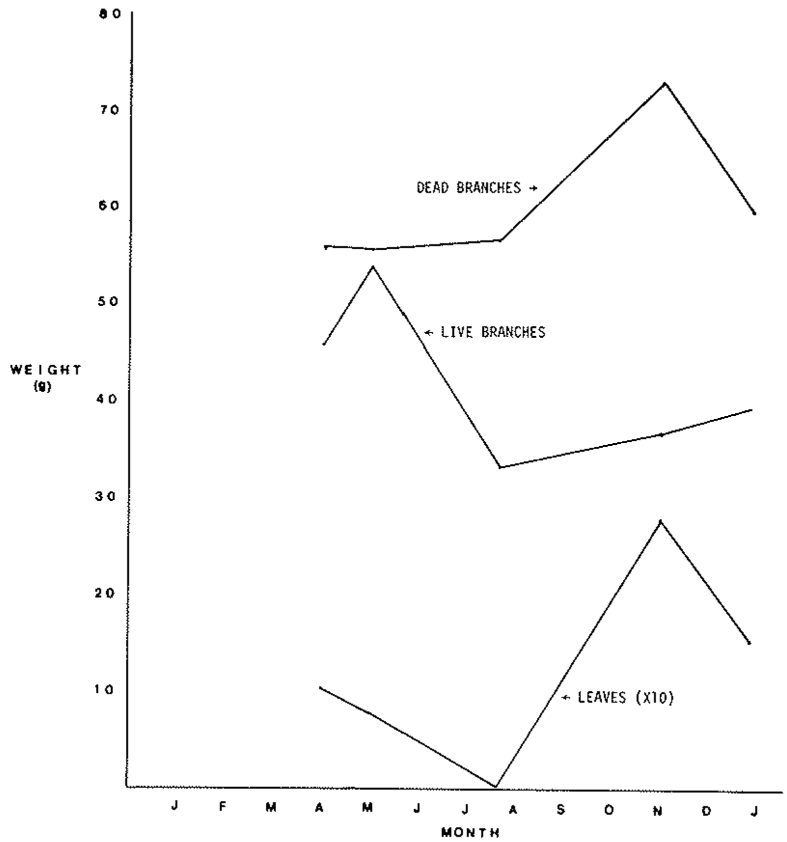

Figure 3. *Cercidium microphyllum* component weights vs. time.

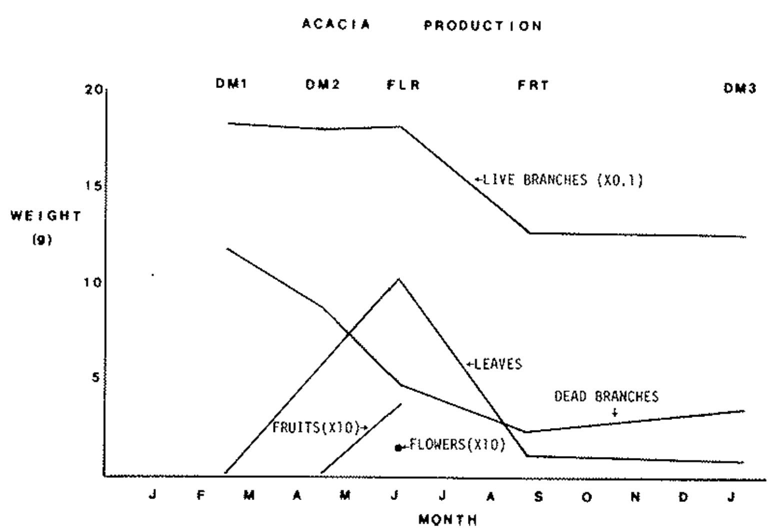

Figure 4. *Acacia constricta* component weights vs. time.

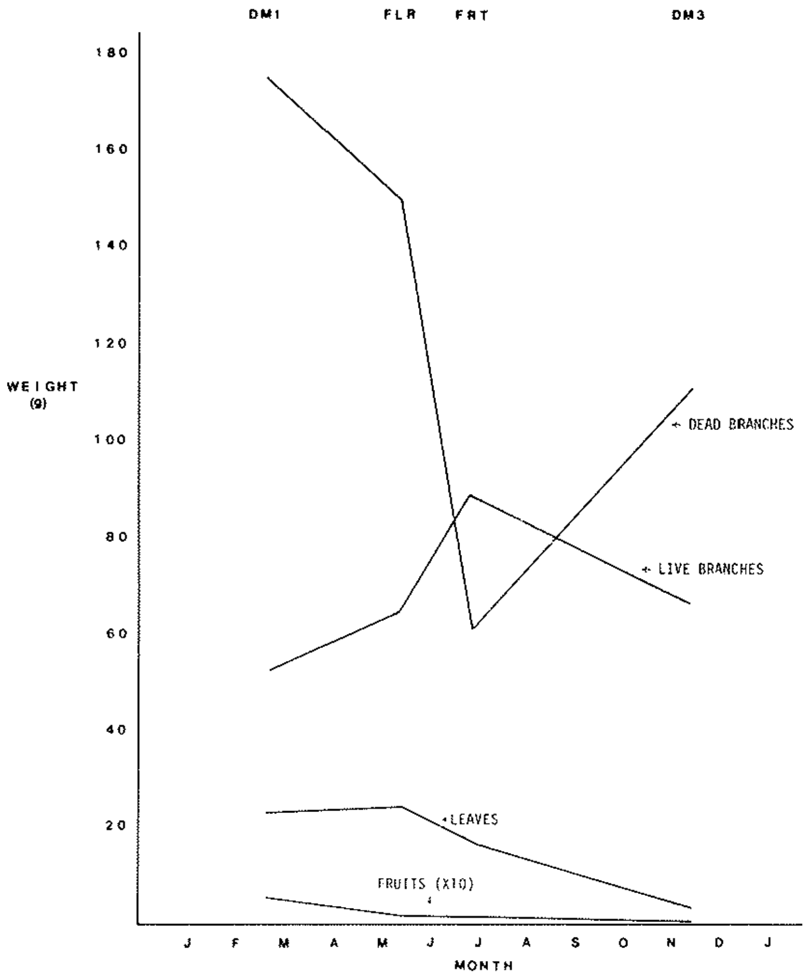

Figure 5. *Ambrosia deltoidea* component weights vs. time.

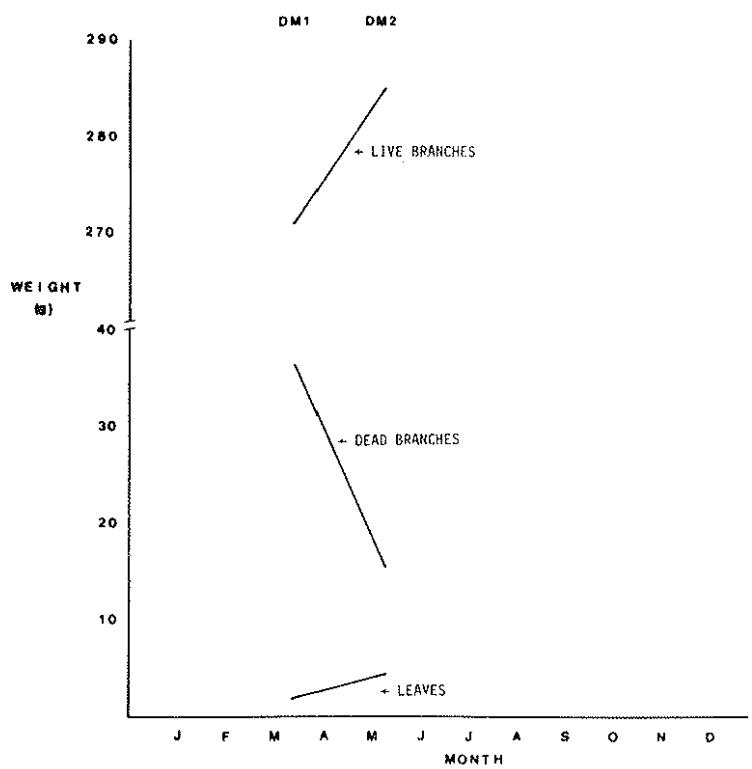

Figure 6. *Olneya tesota* component weights vs. time.

INVERTEBRATES

Clap-Trap Method

The invertebrate population residing within the vegetation canopy at the test site was taken during July, August and September using the clap-trap method which was described in the 1974 report (Thames et al. 1975). The plants sampled included *Cercidium microphyllum*, *Acacia constricta*, *Ambrosia deltoidea*, *Larrea tridentata* and *Olneya tesota*. Plant selection and the logistical details of taking the individual samples were the same as those described in the 1974 report (Thames et al. 1975).

During the sampling period, extending from June 27 through July 11, between 10 and 14 samples of each plant species were collected. Subsequently, four samples from each species were taken approximately twice each week, producing a total of 20 samples for each sampling day. The plants were selected on the criterion of maximum foliage density. Only the vegetation samples were weighed. Invertebrate identifications were made to provide maximum ecological information with respect to taxonomic level.

Several types of information can be derived from the collected data, including patchiness, density (per sample and per unit weight of vegetation collected), host plant specificity and predator:prey ratios. All specimens were preserved in ethanol and saved for subsequent dry weight analysis and further taxonomic breakdown.

The invertebrate collection data are presented in Tables 22-26 (A3UTC40). The Roman numerals correspond to sampling periods.

Literature Cited

Thames, J. L. (Coordinator) et al. 1975. Tucson Basin Validation Site report. US/IBP Desert Biome Res. Memo. 75-3. Utah State Univ., Logan. 26 pp.

Table 22. Invertebrates found on *Acacia constricta*

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
7/11	1	68.7	none
	2	33.2	2 *Ophyrastes*
	3	43.3	1 Chrysomelidae
	4	72.6	1 Reduviidae
	5	42.1	none
	6	69.5	1 spider
	7	43.5	1 Curculionidae 1 spider
	8	69.5	1 cricket
	9	94.1	1 Curculionidae 1 spider
	10	95.2	17 Curculionidae 1 Coleoptera 1 Membracidae 3 spiders
	11	146.5	4 Curculionidae 1 Coccinellidae
7/14	I-1	65.3	none
	2	69.0	none
	3	49.0	1 Lepidoptera (larva)
	4	100.9	6 Curculionidae
7/18	II-1	52.2	none
	2	44.3	1 Chrysomelidae
	3	85.2	none
	4	65.7	1 Membracidae
7/22	III-1	49.1	1 Chrysomelidae 1 spider 2 Curculionidae
	2	55.8	1 Hemiptera (pred.)
	3	77.1	none
	4	46.4	3 Curculionidae
7/25	IV-1	74.0	1 Curculionidae
	2	63.4	1 Hemiptera (pred.) 1 Tenebrionidae 1 Membracidae
	3	73.3	none
	4	92.3	1 Chloropidae (Diptera) 1 spider 1 Curculionidae
7/28	V-1	85.1	1 Phasmidae 1 Curculionidae
	2	64.4	1 Geometridae 1 Formicidae
	3	77.8	1 Phasmidae 1 Curculionidae
	4	81.0	1 Curculionidae
8/3	VI-1	36.8	none
	2	86.8	4 Curculionidae
	3	14.8	4 Curculionidae
	4	65.3	none
8/5	VII-1	63.2	1 Chrysomelidae
	2	113.0	1 Chrysomelidae 1 Coccinellidae 1 Meloidae 1 Curculionidae
	3	58.7	none
	4	86.3	none

Table 22, continued

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
8/8	VIII-1	84.7	none
	2	70.9	none
	3	62.3	none
	4	51.1	none
8/12	IX-1	25.6	none
	2	67.7	none
	3	24.9	1 Membracidae
	4	37.4	1 Geometridae (larva)
8/15	X-1	34.1	2 Braconidae 1 Curculionidae
	2	42.5	1 Chrysomelidae 1 Curculionidae 1 spider
	3	95.7	1 Chrysomelidae 1 Braconidae 1 Hemiptera (nymph)
	4	42.2	1 Chrysomelidae 1 Curculionidae
8/18	XI-1	32.1	1 Membracidae
	2	39.3	1 Chrysomelidae
	3	64.9	1 Curculionidae 3 Lepidoptera (larvae) 1 hemipteran (nymph; pred.)
	4	44.0	2 Lepidoptera (larvae)
	XII-1	33.2	5 Hemiptera (nonpred.) 1 Geometridae (larva)
	2	114.4	1 Geometridae (larva) 2 membracids 1 Hemiptera (nonpred.)
	3	30.0	2 Geometridae 1 Curculionidae 1 Braconidae
	4	44.0	2 Geometridae 1 Salticidae
8/22	XIII-1	46.3	none
	2	47.3	1 Staphylinidae 2 Curculionidae
	3	39.0	1 Hemiptera (pred.)
	4	44.1	1 Staphylinidae 1 Curculionidae 1 Lepidoptera (larva)
8/25	XIV-1	95.8	1 spider 1 Lepidoptera (larva)
	2	74.4	2 Lepidoptera (larvae) 1 Curculionidae
	3	51.2	1 spider 1 Chrysomelidae
	4	34.1	2 spiders 1 Curculionidae 1 Lepidoptera (larva)

Table 23. Invertebrates found on *Ambrosia deltoidea*

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
7/8	1	110.9	none
	2	74.6	1 spider 1 membracid 1 acridid (nymph)
	3	71.2	2 spiders 1 *Stagmomantis*
	4	30.8	none
	5	101.2	1 spider 1 leafhopper 1 acridid (nymph)
	6	192.0	1 acridid (nymph)
	7	100.8	3 spiders
	8	51.3	1 spider
	9	58.0	1 acridid 1 spider
	10	60.8	1 meloid
	11	104.7	2 spider mites 1 meloid
	12	72.9	none
7/15	I-1	69.4	none
	2	78.2	none
	3	69.7	2 spiders
	4	73.9	none
7/18	II-1	34.4	1 spider
	2	66.9	1 spider
	3	53.2	3 scale insects 1 hemipteran (nymph) 1 Chrysomelidae
	4	61.2	1 Chrysomelidae
7/22	III-1	39.0	1 spider
	2	78.0	1 Coccinellidae 1 Chrysomelidae
	3	36.2	14 scale insects
	4	57.3	none
7/25	IV-1	24.8	1 cricket
	2	29.0	none
	3	63.9	9 scale insects
	4	62.5	none
7/28	V-1	106.8	10 scale insects 1 spider
	2	61.8	1 spider 1 Coccinellidae
	3	59.3	1 spider
	4	45.2	1 spider
8/3	VI-1	45.8	none
	2	39.6	1 acridid
	3	95.6	1 acridid
	4	39.6	2 Geometridae 1 Chrysomelidae
8/5	VII-1	33.3	none
	2	111.3	none
	3	54.9	none
	4	103.4	none

Table 23, continued

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
8/8	VIII-1	55.0	2 Acrididae 3 Chrysomelidae 1 spider
	2	80.9	2 Geometridae 1 Acrididae 1 Chrysomelidae
	3	52.6	1 Membracidae 2 spiders 2 Geometridae
	4	33.4	1 Chrysomelidae
8/12	IX-1	71.1	1 Acrididae 1 Geometridae
	2	38.3	1 Neuroptera
	3	55.7	1 Acrididae
	4	69.6	none
8/15	X-1	76.3	2 spiders 1 Membracidae
	2	55.7	1 Salticidae
	3	62.1	1 Geometridae 1 Membracidae
	4	85.6	1 spider 1 Chrysomelidae
8/18	XI-1	97.9	4 scale insects
	2	57.2	1 Salticidae 1 spider
	3	66.6	2 scale insects
	4	82.5	2 Geometridae
	XII-1	83.7	1 Chrysomelidae 1 scale insect
	2	41.0	1 spider
	3	118.5	2 Geometridae
	4	63.0	1 spider 1 Chrysomelidae
8/22	XIII-1	76.0	1 scale insect
	2	39.7	none
	3	29.5	1 Coleoptera 1 Lepidoptera 1 spider
	4	74.0	none
8/25	XIV-1	97.3	2 Chrysomelidae
	2	60.2	2 spiders
	3	43.2	none
	4	75.8	1 spider

Table 24. Invertebrates found on *Larrea tridentata*

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
7/1	1	56.2	1 Coccinellidae 1 Miridae 1 spider
	2	85.9	2 *Tuberculocentrus solus* (Membracidae) 1 Pentatomidae 2 spiders
	3	84.2	1 Coccinellidae
	4	63.9	1 Salticidae 1 Chrysomelidae (*Pachybrachys mellitus*)

Table 24, continued

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
			1 Pentatomidae (*Thyanta pallidovirens*)
	5	81.9	1 *T. pallidovirens* 1 Tettigoniidae (*Insara elegans*)
	6	82.2	1 spider
	7	51.3	1 Salticidae 1 Miridae (*Parthenicus covillae*)
	8	66.0	1 *P. mellitus* 1 *T. solus* 1 *Multareis cornutus*
	9	50.7	1 *T. solus* 3 *M. cornutus* 1 *Macrocephalus uluri* (Phymatidae)
	10	42.4	1 *I. elegans* 1 *T. solus* 1 *P. mellitus*
	11	93.1	3 *T. solus* 2 *M. cornutus* 1 *P. mellitus* 1 Gelechiidae 1 spider
7/14	I-1	34.3	1 Curculionidae 1 Salticidae
	2	65.7	1 *P. mellitus* 1 *T. solus*
	3	89.5	2 *P. mellitus* 3 *T. solus*
	4	71.3	3 *T. solus* 1 Acrididae 1 *P. mellitus*
	II-1	126.8	1 *T. solus* 1 Hemiptera (nymph)
	2	60.9	none
	3	74.9	1 *T. pallidovirens* 1 *T. solus* 1 Hemiptera (pred.)
	4	96.7	1 Geometridae (larva)
7/19	III-1	53.7	1 Braconidae (?)
	2	65.6	none
	3	120.3	1 Salticidae 1 Chrysomelidae (*P. mellitus*)
	4	61.5	none
7/22	IV-1	68.9	1 *T. solus*
	2	76.9	none
	3	75.2	1 *P. mellitus*
	4	55.8	none
7/29	V-1	69.8	none
	2	110.8	1 *T. pallidovirens*
	3	115.4	1 Braconidae
	4	106.3	3 spiders 1 *T. solus* 2 Hemiptera 1 Berytidae 1 *T. pallidovirens*
8/3	VI-1	29.4	2 spiders 1 *P. mellitus* 1 *T. solus*
	2	57.3	1 Reduviidae 1 Geometridae 1 *T. solus*

Table 24, continued

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
	3	53.0	1 Geometridae 1 Membracidae
	4	53.8	none
8/5	VII-1	107.0	none
	2	74.5	1 Gryllidae 1 Berytidae
	3	60.3	none
	4	65.0	1 *T. solus* 1 *P. mellitus*
8/8	VIII-1	91.2	3 *T. solus*
	2	45.8	1 Curculionidae 1 *T. pallidovirens* 1 Reduviidae 1 *T. solus* 1 Acrididae
	3	81.1	2 spiders 1 geometrid 1 Chrysomelidae (*P. mellitus*) 1 *T. solus*
	4	114.0	3 *T. solus* 1 Membracidae 1 *P. mellitus* 1 Acrididae
8/12	IX-1	41.5	none
	2	55.0	none
	3	33.2	2 *T. solus* 1 Salticidae
	4	72.7	1 *Bootettix punctatus*
8/21	X-1	108.8	1 *P. mellitus*
	2	52.9	1 leafhopper
	3	81.6	1 Berytidae
	4	54.0	2 *T. solus* 1 Chloropidae (Diptera)
8/24	XI-1	62.3	1 spider
	2	77.7	1 Salticidae 2 *T. solus* 1 *P. mellitus*
	3	69.3	1 spider
	4	74.1	1 *B. punctatus* 2 leafhoppers 1 *P. mellitus* 1 Lepidoptera
8/28	XII-1	38.6	none
	2	72.2	none
	3	44.0	none
	4	59.2	none
	XIII-1	59.3	1 *T. solus* 1 Coleoptera
	2	38.2	1 Reduviidae 1 *T. solus*
	3	53.6	1 *T. solus* 1 spider
	4	46.8	2 spiders
9/2	XIV-1	43.9	none
	2	78.9	none
	3	42.0	1 Acrididae 1 Braconidae 1 *P. mellitus*
	4	83.0	2 Nematocera (Diptera) 1 *T. solus* 2 Acrididae

Table 25. Invertebrates found on *Cercidium microphyllum*

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
7/4	1	145.7	none
	2	125.1	1 beetle 1 wasp
	3	90.9	none
	4	97.5	none
	5	146.2	none
	6	174.2	1 membracid 1 beetle
	7	72.4	none
	8	190.7	none
	9	181.2	none
	10	95.2	none
7/14	I-1	154.5	none
	2	126.2	none
	3	129.0	none
	4	49.0	none
7/18	II-1	85.6	none
	2	85.0	none
	3	150.2	none
	4	102.9	none
7/22	III-1	103.3	none
	2	109.1	1 Chrysomelidae
	3	95.8	none
	4	93.3	1 hemipteran
7/25	IV-1	91.2	2 scale insects
	2	95.8	none
	3	165.8	none
	4	83.7	1 scale insect (discard)
7/29	V-1	100.0	none
	2	134.8	1 spider 1 Membracidae (nymph)
	3	142.2	none
	4	119.3	1 salticid
8/3	VI-1	117.0	1 cricket
	2	149.3	2 beetles 1 cricket 1 Membracidae
	3	50.1	2 Chrysomelidae
	4	99.6	none
8/9	VII-1	65.8	none
	2	166.4	1 Membracidae (nymph)
	3	54.2	none
	4	86.3	1 Membracidae (nymph)
8/12	VIII-1	79.8	1 Chrysomelidae
	2	118.6	none
	3	133.6	none
	4	141.6	1 Chrysomelidae
8/15	IX-1	109.3	1 wasp
	2	88.0	none
	3	77.7	1 Membracidae
	4	60.2	none

Table 25, continued

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
8/18	X-1	53.3	none
	2	148.9	none
	3	160.3	1 Chrysomelidae
	4	133.9	none
8/21	XI-1	74.0	none
	2	47.5	none
	3	67.5	none
	4	139.9	none
8/24	XII-1	94.9	none
	2	68.3	none
	3	97.6	none
	4	74.2	none
8/28	XIII-1	55.7	1 Meloidae
	2	76.8	1 Pentatomidae
	3	63.7	none
	4	45.7	none
9/2	XIV-1	82.2	none
	2	168.0	none
	3	72.6	none
	4	117.6	none

Table 26. Invertebrates found on *Olneya tesota*

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
6/27	1	36.1	1 beetle
	2	69.7	2 spiders
	3	77.1	1 hemipteran
	4	84.3	1 spider
	5	87.1	none
	6	94.1	3 spiders
	7	32.3	none
	8	71.5	none
	9	62.5	1 hemipteran
	10	98.0	none
7/1	I-1	71.6	none
	2	135.1	2 Chrysomelidae
	3	108.2	none
	4	69.7	1 spider
7/15	II-1	144.5	1 wasp 1 cricket 1 Curculionidae
	2	122.9	1 spider
	3	111.0	none
	4	80.8	1 salticid
7/18	III-1	168.2	none
	2	113.7	1 Curculionidae 1 ant
	3	82.8	3 spiders 1 ant
	4	82.4	1 spider
7/25	IV-1	196.1	none
	2	82.2	none
	3	95.2	1 spider
	4	85.3	none

Table 26, continued

Date (1975)	Sample number	Fresh vegetation weight(g)	Invertebrates captured (taxa)
7/28	V-1	138.0	3 ants
	2	41.9	2 spiders
	3	45.8	none
	4	54.2	1 spider
8/3	VI-1	52.0	1 cricket 1 spider 1 Chrysomelidae
	2	62.3	1 cricket 2 spiders
	3	64.2	none
	4	57.8	1 Membracidae 2 spiders
8/5	VII-1	61.8	1 salticid
	2	69.6	2 spiders
	3	64.3	1 spider
	4	42.2	none
8/8	VIII-1	30.8	none
	2	66.8	none
	3	107.6	1 spider
	4	78.5	none
	IX-1	52.9	1 Chrysomelidae 1 moth
	2	69.6	1 salticid
	3	67.6	1 spider
	4	57.5	2 spiders 1 beetle
	X-1	78.7	1 spider
	2	25.7	none
	3	38.6	1 cricket 1 leafhopper
	4	54.9	3 spiders 1 beetle
8/18	XI-1	84.5	none
	2	41.0	1 Curculionidae
	3	57.5	1 wasp
	4	47.5	none
8/20	XII-1	130.7	1 Geometridae
	2	40.4	1 wasp
	3	39.0	1 salticid
	4	82.4	1 spider
8/22	XIII-1	35.9	1 Geometridae 1 moth 2 *Ophyrastes*
	2	68.6	none
	3	53.5	2 spiders 2 Membracidae 2 ants 1 staphylinid
	4	46.8	none
	XIV-1	78.7	3 Hemiptera 1 Geometridae
	2	77.3	none
	3	67.4	1 Salticidae
	4	83.7	none
	XV-1	140.1	1 spider
	2	76.8	2 Geometridae
	3	49.4	none
	4	50.6	1 Salticidae

VERTEBRATES

Reptiles

In a continuation of the reptile study initiated in the fall of 1973, reptile activity was monitored from April through October on both the western and eastern 100-m^2 study areas (A3UTC41).

Twenty-five can-traps (15 liters each) were used on each of the two study plots. Captured lizards were sexed, weighed, measured and toe-clipped. Numbers were painted on the lizards' backs to enable determination of density data. These data include only lizards captured for the first time in 1975, although there were many recaptures of lizards first collected in 1974.

Table 27 indicates the combined April through October data for each species, the number of captures per hectare, the mean weight of individuals captured and the total biomass captured per hectare.

The 1975 capture list includes the leopard lizard (*Crotaphytus wislizenii*) which, although it was seen in each of the two study areas in 1974, was not captured until 1975. This species is named for its body spots. The leopard lizard prefers open, sandy areas where it runs down its insect and lizard prey. It runs on its hind legs when at full speed and usually bites when handled.

Small Mammals

Nocturnal rodent biomass on the Silverbell site was determined in late May and early September 1974. Methodology was identical to that described in Thames et al. (1974). Trapping was carried out in Sec. 21, T11S, R9E, Pima County, Arizona, on areas (control sites) A3UCE12 and 14 (site designation and DSCODE) and A3UCE13 and 15 (manipulated sites, run over by off-road vehicles). Traps were run three nights in the spring and three nights in the fall of each year, yielding yearly pre- and postreproduction population and biomass figures. Traps were checked at midnight and sunrise during each of the three nights in a trapping session.

Table 28 gives the constants used in computing the tabulated and graphed values. Results of the 1975 trapping at Silverbell are given in Tables 29-35.

The biomass of nocturnal rodents took a dramatic drop in 1975. No cricetids were caught on any of the sites. Within the heteromyids, the greatest reduction in biomass occurred with *Perognathus*. The population of *P. amplus* dropped less drastically than populations of *P. baileyi* and *P. penicillatus*. Decrease in *P. amplus* was first noticed in the May 1974 trapping period and has steadily declined since. The *P. baileyi* and *P. penicillatus* populations were at a peak in September 1974. The spring of 1975 showed a dramatic drop in these two populations, which continued through the September sampling.

The population decrease in *Dipodomys merriami* was less drastic. All species had undergone a biomass decrease and, as noted for the increases of 1973 and 1974, the populations seem to do so under different living regimes.

The difference between the manipulated (A3UCE13, 15) and control (A3UCE12, 14) sites became even less conspicuous in 1975. The manipulated sites still had a slightly higher biomass than the control sites.

Literature Cited

Thames, J. L. (Coordinator) et al. 1974. Tucson Basin Validation Site report. US/IBP Desert Biome Res. Memo. 74-3. Utah State Univ., Logan. 33 pp.

Table 27. Reptile biomass data for April-October 1975

Species	n/ha	grams	grams/hectare
Cnemidophorus tigris	43.5	7.0	304.5
Callisaurus draconoides	18	5.2	93.6
Uta stansburiana	29.5	2.6	76.7
Sceloporus magister	3	11.2	33.6
Coleonyx variegatus	25.5	2.2	56.10
Phrynosoma solare	4.5	33.4	.3
Urosaurus graciosus	2.5	2.1	5.25
Crotaphytus wislizenii	1.0	45.8	45.8

Table 28. Values used as constants in computing the g/ha values in Tables 29-35

Species	Abbreviation	r Value x Home Range (Meters)	x Weight (Grams)	Silverbell Computed Sample Area (Hectares)
Dipodomys merriami	DIPMER	20.3	39.5	1.44
Perognathus amplus	PERAMP	16.6	11.0	1.22
Perognathus penicillatus	PERPEN	14.8	19.6	1.12
Perognathus baileyi	PERBAI	16.7	34.0	1.23
Perognathus intermedius	PERINT	14.4	15.0	1.11
Onychomys torridus	ONYTOR	26.1	26.5	1.81
Neotoma albigula	NEOALB	15.3	187.0	1.15
Sigmodon arizonae	SIGARI	15.1 (?)	50.0	1.14 (?)
Peromyscus merriami	PERMER	12.5	16.0	1.00
Mus musculus	MUSMUS	15.3 (?)	12.0	1.15 (?)

Table 29. Live weight biomass of nocturnal rodents on unmanipulated site 12

	May 1975 N	May 1975 g/ha	Sep 1975 N	Sep 1975 g/ha
DIPMER	11.8	466	8.3	329
PERPEN	110.7	210	11.6	228
PERAMP	7.4	81	.8	9
PERBAI	3.3	112	2.4	82
PERINT	0	0	0	0
PERMER	0	0	0	0
MUSMUS	0	0	0	0
Subtotals	33.2	869	23.1	648
NEOALB	0	0	0	0
Totals	33.2	869	23.1	648

Table 30. Live weight biomass of nocturnal rodents on unmanipulated site 14

	May 1975 N	May 1975 g/ha	Sep 1975 N	Sep 1975 g/ha
DIPMER	13.9	549	2.8	110
PERPEN	6.3	123	4.5	88
PERAMP	9.8	108	1.7	18
PERBAI	4.8	163	4.8	163
PERINT	0	0	0	0
PERMER	0	0	0	0
MUSMUS	0	0	0	0
Subtotals	34.8	943	13.8	379
NEOALB	0	0	0	0
Totals	34.8	943	13.8	379

Table 31. Average live weight biomass of nocturnal rodents on unmanipulated sites 12 and 14

	May 1975 N	May 1975 g/ha	Sep 1975 N	Sep 1975 g/ha
DIPMER	12.9	508	5.6	439
PERPEN	58.5	167	8.1	158
PERAMP	8.6	95	1.3	14
PERBAI	4.1	138	3.6	123
PERINT	0	0	0	0
SIGARI	0	0	0	0
MUSMUS	0	0	0	0
Subtotal	84.1	908	18.6	734
NEOALB	0	0	0	0
Total	84.1	908	18.6	734

Table 32. Live weight biomass of nocturnal rodents on manipulated site 13

	May 1975 N	May 1975 g/ha	Sep 1975 N	Sep 1975 g/ha
DIPMER	13.9	549	10.4	411
PERPEN	13.4	263	8	158
PERAMP	3.3	36	1.7	18
PERBAI	8	272	4	136
PERINT	2.7	43	.9	14
SIGARI	0	0	0	0
MUSMUS	0	0	0	0
Subtotal	41.3	1163	25	737
NEOALB	0	0	0	0
Total	41.3	1163	25	737

Table 33. Live weight biomass of nocturnal rodents on manipulated site 15

	May 1975 N	May 1975 g/ha	Sep 1975 N	Sep 1975 g/ha
DIPMER	14.6	576	11.8	466
PERPEN	11.5	126	7.4	81
PERAMP	7.4	81	0	0
PERBAI	2.4	82	4.1	138
PERINT	0	0	0	0
SIGARI	0	0	0	0
MUSMUS	0	0	0	0
Subtotal	35.9	865	23.3	685
NEOALB	0	0	0	0
Total	35.9	865	23.3	685

Table 34. Average live weight biomass of nocturnal rodents on manipulated sites 13 and 15

	May 1975 N	May 1975 g/ha	Sep 1975 N	Sep 1975 g/ha
DIPMER	14.3	563	11.1	439
PERPEN	12.5	195	7.7	120
PERAMP	5.5	59	.9	9
PERBAI	5.2	177	4.1	137
PERINT	1.4	22	.5	7
SIGARI	0	0	0	0
MUSMUS	0	0	0	0
Subtotal	38.9	986	24.3	712
NEOALB	0	0	0	0
Total	38.9	986	24.3	712

Table 35. Average live weight biomass of nocturnal rodents on all sites

	May 1975 N	May 1975 g/ha	Sep 1975 N	Sep 1975 g/ha
DIPMER	13.6	536	8.5	433
PERPEN	35.5	181	7.9	139
PERAMP	7.1	77	1.1	12
PERBAI	4.7	158	3.9	130
PERINT	.7	11	.3	4
PERMER	0	0	0	0
ONYTOR	0	0	0	0
SIGARI	0	0	0	0
MUSMUS	0	0	0	0
Subtotal	61.6	963	21.7	724
NEOALB	0	0	0	0
Total	61.6	963	21.7	724