Paik, Y. K. Seasonal changes in Drosophila populations in two adjacent areas in Korea.
DIS 31: 151-153 (1957)

The purpose of the present article is to report the results of a survey of seasonal changes in population size, and of the sex-ratio balance, of wild Drosophila populations. Samples were taken at two woodland areas around the foot of Mt. Mootung (1000 m in height), about five kilometers distant from the University. Collections were made, as a rule, at intervals of one week during the whole season from July, 1956, to June, 1957, by sweeping over large apple-baited trap-cans. At each of two areas four traps were placed in a row (10 m apart) at the fixed positions throughout the whole period. Baits were changed every week. All collections were done for three hours right before sunset in the late afternoon.

Our collections records show that a total of 12,918 flies were taken during the period in both areas. The area-1 collection consisted of 6082 flies, representing twenty-seven sympatric species, of which nineteen belonged to the genus Drosophila (including subgenera Drosophila, Sophophora, and Pholadoris) and eight to other genera of the family (Amiota, Mycodrosophila, Microdrosophila, and Leucophenga). The 6836 flies collected at area 2 represented twenty-five sympatric species, of which sixteen belonged to the genus Drosophila (including three subgenera, as in area 1) and eight to other genera (including the four found at area 1 plus Scaptomyza).

Changes at each of the two areas, showed two sharp seasonal maxima in size, one in the autumn (October-November) and the other in the spring (April). Total populations sank to an extremely low level, statistically zero, during the cold winter months (December-February), which can generally be considered a severe "population bottle-neck period" in our climate. Total populations also dwindled to a low level during the warm summer months (July-August). Results obtained here are in striking agreement with the pattern of seasonal changes in Drosophila populations of a temperate climate predicted by Professor Patterson (Univ. of Texas Pub. 4313: 203, 1943). The total population changes from month to month throughout the year were closely concordant with each other in the two populations at the two areas (correlation coefficient, $r = 0.969$ and $t = 12.402$).

Species-specific changes in the populations were also considered. Records of six species and two complexes of the genus Drosophila which were abundant or common throughout the year were selected for this purpose. Most of the selected species showed two yearly maxima, the rest one sharp maximum. Furthermore, monthly changes in relative frequencies were species specific. This is confirmed in some degree by computing the correlation coefficient (r) for relative frequency of a given species in the two areas. Some of the results are summarized in the first table. The data used for figuring the correlations were the numbers of flies of a given species collected in a given month divided by the total number of flies of the genus Drosophila collected in the same month.

	Relative Frequency area 1	area 2	Seasonal peak	r	t
D. auraria	8%	11%	autumn and spring	0.964	11.463
D. transversa-complex	14	25	autumn and spring	0.928	7.876
D. nigromaculata	3	5	autumn and spring	0.763	3.439
D. cheda-lacertosa	2	3	autumn and spring	0.781	3.954
D. bizonata	30	30	winter and spring	0.998	49.921
D. coracina	30	16	spring	0.955	10.177
D. lutea	6	6	autumn	0.991	23.409
D. suzukii	5	4	autumn	0.874	5.687

D. bizonata represents an interesting case. This is the only species that was present throughout the whole year. Only one female was trapped at area 1 in February, when the mean temperature was below zero centigrade; none of any other species was trapped in this month. Nevertheless, this species was trapped at the two areas in considerable numbers during the rest of the "population bottle-neck period," during which cold weather near the freezing point continued. In addition to this species, out of ten rare species collected at either one or both areas, seven, including D. histrio, D. rubifrons, D. bifasciata, D. sternopleuralis (in Okada's MS), D. helvetica, D. sp. (quinaria section), and D. sp. (subgenus Drosophila), were collected sporadically only in the winter months. D. bizonata was the most abundant of these species adapted to winter environment.

The common and abundant species were again selected for a study of sex-ratio balance in the populations. Some of the results are summarized in the second table.

Species	Area	Females trapped	Males trapped	% female	% male	Chi square 1 d.f.	P
D. auraria	1	187	252	42	58	9.62	*
	2	239	431	36	64	55.02	*
D. lutea	1	163	228	42	58	10.81	*
	2	148	271	35	65	36.11	*
D. suzukii	1	60	250	19	81	116.45	*
	2	54	186	23	77	72.6	*
D. bizonata	1	1166	832	58	42	55.83	*
	2	1341	803	63	37	135.0	*
D. cheda-lacertosa	1	58	54	52	48	0.41	0.8-0.7
	2	110	74	60	40	7.04	*
D. nigromaculata	1	85	81	51	49	0.1	0.8-0.7
	2	183	166	52	48	0.83	0.5-0.3
D. transversa-complex	1	431	490	47	53	3.78	0.083-0.046
	2	761	906	46	54	12.61	*
D. coracina	1	776	840	48	52	2.54	0.157-0.083
	2	443	523	46	54	7.44	*
Totals	1	2926	3027	49	51	1.71	0.317-0.157
	2	3279	3365	49	51	1.11	0.317-0.157

* Probability much less than 0.01.

The deviation from the expected 50:50 sex ratio is striking in a number of species; but in the total number of flies collected it is not significant. Furthermore, female or male preponderance in each species is not random in the two populations at the two areas, but always consistent. Whenever a discrepancy between the sexes is apparent, it seems to b e due rather to a differential attraction to the bait than to a real preponderance of one sex; and the differential attraction to the bait seems to be species specific. A more critical study of this problem is being attempted.