Batabyal, A.K. and N.S. Sidhu. Indian Veterinary Research Institute, Izatnagar, India. Fertility study on different mutant strains of Drosophila melanogaster.

Fertility study on Drosophila melanogaster with reference to mutations and variation of egg number among the strains has not been carried out so far. Studies on the egg production in inbred lines and selected stocks have been carried by various authors. The present note reports variation in egg production and the fertility differences among the mutant strains of D. melanogaster.

Table 1. Mean daily egg production of different stocks of Drosophila melanogaster

Sl. No.	A O_1 bw st	B Izat-4*	C Random bred	D Or-K	E dp b cn	F sc cv v f B y f
1.	21.85	24.28	27.28	20.85	-	24.14
2.	13.28	30.85	20.71	31.71	19.48	-
3.	17.71	13.26	21.71	29.85	20.00	25.14
4.	17.42	33.28	26.00	19.00	-	24.71
5.	22.42	12.71	26.28	31.14	22.82	-
6.	20.71	18.00	28.85	24.00	-	28.28
7.	18.14	-	23.28	27.14	19.00	26.28
8.	19.00	29.14	16.85	28.71	18,25	26.14
9.	15.28	29.85	23.85	28.57	-	31.57
10.	24.00	25.71	14.28	30.00	14.85	24.85
Av.	18.92	24.12	22.90	27.09	19.06	26.38

* al b pr Bl c dp In cn sp px Cy s O

Ten strains in all, including Or-K (a control) stock of D. melanogaster were studied. Ten females were utilized per stock and egg productions from the 3rd to the 8th day, the peak period, were recorded. Means were obtained for various strains and the analysis of variance carried out. The experiment was broken up into two parts keeping two strains common in both for comparison. In the second part of the experiment live yeast was added to the food while it was not used in the first part of the experiment.

Results: The results obtained are presented in tables 1 to 5. In the first part of the experiment, egg production for 7 days (3rd to 9th) for 6 stocks is presented in case of food medium devoid of yeast. The maximum egg production (27 eggs/day) are obtained in the case of Or-K, the control stock. All the mutant strains have lower egg production. Analysis of variance indicates a significant difference between strains studied. The critical differences test (Table 3) shows significant differences in all except in a few cases as given in the table.

Table 2. Analysis of variance for egg number in D. melanogaster.

Source of variation	df	S.S.	M.S.S.	F
Between stocks	5	496.47	99.29	2.92*
Within stocks	47	1619.03	34.44	

In the second part of the experiment egg production has been recorded on Burdick's medium as in the first case but with the addition of live yeast. The data obtained are presented in table 4 which show obvious differences between strains. The control stock again has maximum average egg production (65 eggs/day).

The egg production in the presence of live yeast is nearly double compared to that on food medium devoid of live yeast.

Analysis of variance (Table 5) shows highly significant differences between strains. Again, the mutant stocks have lower egg number compared to the Or-K stock. Mutations seem to lower fertility and thus fitness of the stocks. These results indicate that the mutations in case of various Mendelian factors are lowering fertility in case of the laboratory Drosophila. As far as the authors are aware no literature is available on the fertility studies on the mutant strains of D. melanogaster for comparison. Further studies on this problem are in progress.

(Tables 3, 4 and 5 on next page)

Table 3. Critical differences between the means of egg in different stocks of D. melanogaster

Differences	Critical differences at 0.05 level
A~B - 5.20	1.83
A~C - 3.90	1.76
A~D - 8.17	1.76
A~E - 0.14	2.03
A~F - 7.46	1.89
B~C - 1.22 N.S.	1.83
B~D - 2.97	1.83
B~E - 5.06	2.06
B~F - 2.26	1.95
C~D - 4.19	1.76
C~E - 3.84	2.03
C~F - 3.48	1.89
D~E - 3.03	2.03
D~F - 0.71 N.S.	1.89
E~F - 7.32	2.11

Table 4. Mean daily egg production of different stocks of D. melanogaster

Sl. No.	Or-K	O_1 bw st	r	y v f	Cy/Bl L^2	ru h th st cu sr e^s ca
1.	59.63	37.50	55.33	60.50	44.83	46.00
2.	61.66	36.83	33.50	50.50	48.50	65.50
3.	60.83	-	33.83	65.00	35.83	50.00
4.	66.66	39.82	54.16	60.83	42.16	60.00
5.	71.50	19.50	61.33	53.16	42.33	-
6.	64.66	27.50	51.16	56.00	42.16	-
7.	38.83	46.00	24.83	57.83	52.33	42.00
8.	76.16	36.16	51.50	47.33	49.66	48.50
9.	71.16	41.00	-	52.33	43.00	30.33
10.	74.83	41.33	58.00	47.83	37.00	-
Av.	64.59	36.18	47.07	55.13	43.78	48.90

Table 5. Analysis of variance for egg number in D. melanogaster strains

Sources of variation	df	S.S.	M.S.S.	F
Between stocks	5	4573.48	914.69	10.53*
Within stocks	49	4254.99	86.83	

Bürki, K. and F.E. Würgler. Swiss Federal Institute of Technology, Zürich, Switzerland. A quick method for the determination of the oocyte stages in the ovaries of young D. melanogaster females.

Class-B oocytes of Drosophila, which correspond to the stages 7 to 13 of oogenesis, are interesting for mutation work. For the definition of the different classes and stages see R.C. King, Ovarian Development in Drosophila melanogaster, Academic Press 1970, p. 145. If class-B oocytes from different stocks are to be used in a set of experiments, a quick and simple method for counting the different oocyte stages should be available in order to exclude possible differences in oogenesis with different types of females. A method initially developed for the analysis of living embryos of the gall midge Heteropeza pygmaea by F. Bärlocher (Experientia 27:985, 1971) can be applied in the following way:

Ovaries of newly hatched females are prepared in a small dish containing insect Ringer solution (0.65g NaCl, 0.025g KCL, 0.03g $CaCl_2$, 0.025g $NaHCO_3$ in 100 ml H_2O). A single ovary is placed on a slide, a drop of Ringer solution is added and the individual ovarioles are separated from one another. The ovarioles are now covered by a cover glass. Under a phase contrast microscope (using a 25x objective and 8x oculars) the Ringer solution below the cover glass is gently sucked away with a piece of filter paper. Gradually, as the solution is removed, the oocytes become more and more flattened. At a certain moment the different nuclei (oocyte and nurse cell nuclei) and the delimination between oocyte and nurse cells become clearly visible. If too much of the solution is sucked away the oocytes will burst. In such preparations the oocyte stages 4 to 11 can easily be classified.

An advantage of this method is that in addition to fresh material, ovaries of females stored in the refrigerator for several weeks can also be analysed.

Work supported by Schweizerischer Nationalfonds zur Förderung der wissenschaftlichen Forschung.