Godbole, N.N., R.M. Kothari and V.G. Vaidya. University of Poona, India. Studies on the nutritive value of different indigenous cereals for the larvae of D. melanogaster.

Cornmeal-agar medium, for cultivation of Drosophila, together with its variations has been described by Bridges and Darby (1933). These media are now widely used in Drosophila laboratories throughout the world. However, the necessity of developing new media suitable for quantity production, healthy flies and low mortality rate of weak mutants, still persists. In addition to the above well recognised criteria, easy availability and low cost of chosen ingredients depending upon the location cannot be overlooked. The present study is an attempt to select a suitable indigenous cereal as an ingredient from amongst the following - bajra (Pennisetum typhoideum), barley (Hordeum vulgare), corn (Zea mays), jowar (Sorghum vulgare), rice (Oryza sativa) and wheat (Triticum vulgare) - on the basis of their nutritive value judged by pupal weights.

The Oregon-K strain of D. melanogaster was used in the present investigation. Corn was replaced by a particular cereal under consideration in the following basic formula for the medium, keeping all the other ingredients constant: 18 g cornmeal, 16 g jaggery, 6 g yeast, 6 g agar in 320 ml distilled water. For a particular cereal used in the medium, a set of 25 glass vials (size 7.5 cm X 2.5 cm) was prepared by placing in each vial 6 g ± 50 mg of the medium concerned. Eggs were obtained in large numbers by using the method introduced by Delcour (1969). Ten freshly laid eggs were then transferred to each vial under sterile conditions and were allowed to develop further at 22±1°C. In general, the larval period varied from 10-12 days. The pupal weights were recorded and mean pupal weights were calculated separately for each set. The differences observed between mean pupal weights of different sets were then tested for their significance by using the standard statistical procedure.

It is clear from Table 1 that the mean pupal weights vary significantly for each cereal used in the medium keeping other ingredients constant. In order of their suitability as ingredients in the medium judged on the basis of mean pupal weights, the cereals can be arranged in the following series - jowar, wheat, barley, bajra, corn and rice.

Table 1. Summary of net results obtained by comparison of mean pupal weights.

Cereal used	Number of pupae	Mean pupal wt, mg	Variance of the mean	Difference between mean pupal weights, mg	Normal deviate	Probability 5%	Probability 1%
Jowar	216	1.879	0.000496				
				0.127	5.125		
Wheat	219	1.752	0.000118				
				0.101	4.106		
Barley	206	1.651	0.000487			1.960	2.576
				0.093	3.723		
Bajra	212	1.558	0.000137				
				0.073	3.311		
Corn	202	1.485	0.000349				
				0.158	7.612		
Rice	222	1.327	0.000082				

The biochemical data (Table 2) showing the composition of different cereals used in this investigation substantiates the results obtained (Aykroyd, 1966). Jowar is rich in carbohydrates, fats as well as minerals, all of which are essential metabolites for the synthesis of ATP. It furnishes the maximum amount of total hydrolysable starch, wheat being second amongst the cereals used (Sahasrabuddhe, 1948). Its mineral content is also relatively high. The role of minerals like Mg^{++} in ATP synthesis, RNA synthesis and activation of amino acids prior to protein biosynthesis is well known. Obligatory requirement of Ca^{++} in lipid metabolism is also known. In fact, these are the index reactions for growth. Trace metal ions as activators of different enzymes regulating overall metabolism and physiological processes are of vital importance. Jowar also provides adequate fat content necessary for the synthesis of membranes of different cell organellae which are basic sites of enzyme action. The protein content of jowar is relatively low. However, the amino acid composition reveals that it is richer in leucine, isoleucine, histidine, methionine, valine, phenylalanine, threonine and

tryptophane (F.A.O., 1968) than the rest of the cereals used. These amino acids are essential for the normal growth and development of Drosophila (Lafon, 1939; Hinton et al, 1951). Thus, jowar fulfills all the requirements for boosting up BMR, subsequently yielding healthy pupae as judged from higher pupal weights.

Table 2. Composition of cereals used (Aykroyd, 1966)

Cereal name	Moisture	Fat	Protein	Carbohydrates	Minerals
Jowar	11.9	1.9	10.4	72.6	1.6
Wheat	12.8	1.5	11.8	71.2	1.5
Barley	12.5	1.3	11.5	69.6	1.2
Bajra	12.4	5.0	11.6	67.5	2.3
Corn	14.9	3.6	11.1	66.2	1.5
Rice	13.7	0.5	6.8	78.2	0.6

Although wheat has more protein content than jowar, it is a poor source of tryptophane, methionine, leucine, isoleucine, phenylalanine, threonine, etc. The amount of total hydrolysable starch is also less than that in jowar. Wheat therefore furnishes comparatively less energy for boosting up BMR. Though almost identical to jowar in fat and mineral content, the above-mentioned major deficiencies in wheat have culminated in pupae with lower weights.

Barley and bajra rank third and fourth respectively in order of their nutritional value as judged from pupal weights. Barley is found to be superior to bajra, perhaps due to its high content of total hydrolysable carbohydrates. In protein contents, both barley and bajra are almost identical as far as the quantity is concerned, but the former has more hydrolysable protein than the latter (Aykroyd, 1966). Further, barley is richer in essential amino acids (isoleucine, lysine, phenylalanine, threonine, valine and histidine) than bajra (F.A.O., 1968). Although bajra is richer in fat than barley, it seems that this alone does not become a decisive factor for growth in the early stages of development.

Corn, which is very widely used in the preparation of Drosophila medium, ranks fifth in order of its nutritive value, judged from pupal weights, amongst the cereals tested here. It has less minerals and lesser amount of hydrolysable carbohydrates. Although it is quite rich in protein quantitatively, it is inferior in being lysine deficient, poor in tryptophane and other essential amino acids (Block et al, 1951).

Rice comes last in its nutritive value. It is very poor in mineral content and poorest in fat content. Although rice affords appreciably higher carbohydrate content than the rest, its total hydrolysable carbohydrate is comparatively less. Rice is not only low in protein content, but also poor in leucine, isoleucine, histidine, tryptophane, etc. It seems from the lowest pupal weights observed, that due to lack of these essential amino acids, the available energy cannot be chanelised for larval growth.

References: Aykroyd, W.R., 1966 in The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets, Revised VI Ed. by Gopalan, C. and S.C. Balasubramaniam (Indian Council of Medical Research, New Delhi); Block, R.J. and D. Bolling, 1951 in The Amino Acid Composition of Proteins and Foods: Analytical Methods and Results, Charles Thomas Pub., Springfield, Ill.; Bridges, C.B. and H.H. Darby, 1933 Amer. Nat. 57: 437; Delcour, J., 1969 DIS 44: 133; F.A.O., 1968 Amino Acid Content of Foods and Biological Data on Proteins by Food Consumption and Planning Branch, Nutrition Division; Hinton, T., D.T. Noyes and J. Ellis, 1951 Physiol. Zool. 24: 335; Lafon, M., 1939 Ann. Physiol. Physiochem. Biol. 15: 215; Sahasrabuddhe, D.L. 1948 in Research Papers on Food Problems, N.W. College, Poona.

Moth, J.J. and J.S.F. Barker. University of Sydney, N.S.W., Australia. Estimation of relative fecundity of two genotypes (or species) in mixed populations.

There is ample evidence that the fitness of genotypes or species in mixed populations cannot generally be predicted from estimation of fitness (or fitness components) in pure populations (e.g. Barker and Podger 1970). We are interested in analytical analyses of competitive outcome between various strains of D. melanogaster and D. simulans, and particularly in the effects of variation in population density and relative frequency of the two species on components of fitness. As the eggs of these species are indistinguishable, analyses of