Table 1 *Differential reactions of variants of race 77*

Virulence value		Year of	Host-pathogen response on			
Old	New	detection	*Lr10**	*Lr20*	*Lr26*	*IWP–94*
77	45R31	1955	0;−1	4	0;	0;−1
77-A	109R31	1974	4	4	0;	0;−1
77-A-1	109R23	1976	4	0;−1	0;	0;−1
77-1	109R63	1984	4	4	4	0;−1
77-2	109R31-1	1984	4	4	0;	4

* Temperature sensitive.

One more sample received from Wellington during 1984 similar to virulence 77-A (109R31) had additional virulence on IWP-94 a line in set-0. Isolations from IWP-94 confirmed that the test isolate is different from the type culture 77-A (109R31). The new isolate though has additional virulence on IWP-94 had no perceivable difference on genes *Lr1* to *Lr29*. This virulence designated as 77–2 (109R31-1) (table 1) has the following avirulence/virulence formula:— *Lr9*, *Lr19*, *Lr24*, *Lr25*, *Lr26*, *Lr28*, *Lr29*, *Lr18* (Sabikei)/*Lr1*, *Lr2a*, *Lr2c*, *Lr2d*, *Lr3*, *Lr10*, *Lr11*, *Lr12*, *Lr13*, *Lr14a*, *Lr14b*, *Lr14ab*, *Lr15*, *Lr16*, *Lr17*, *Lr18*, *Lr20*, *Lr21*, *Lr22*, *Lr27*.

Most of the selections derived from the Spring × Winter wheat programme of CIMMYT contain IB/IR translocation wherein, the gene *Lr26* is located. Occurrence of new virulences 77-1 (109R63) and 77-2 (109R31-1) necessitates the use of gene combinations *Lr10* + *Lr9* or *Lr9* + *Lr26* that can accord total resistance to brown rust under Indian situations.

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A POTENTIAL PREDATOR FOR SORGHUM MITE, *OLIGONYCHUS INDICUS* (HIRST.)

S. MOHAN and P. KARUPPUCHAMY
Department of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore 641 003, India.

Oligonychus indicus (Hirst.) is one of the major pests of sorghum causing severe damage in Tamil Nadu and many parts of India[1]. The nymphs and adults feed on the leaves by remaining on the lower surface causing red spots which later coalesce forming large red patches hindering photosynthetic activity. Though chemical control is the main tool in pest management of sorghum, it should be adopted only as a last resort[1]. Presently attention is focussed on identifying natural enemies and studying their predatory potential in order to include them in the biological control programmes. Reddy and Jagadish[2] reported *Scolothrips indicus* Priesn as a potential predator of sorghum mite preying on nymphs and adults. A coccinellid beetle, *Stethorus pauperculus* (Weise) was also found to feed on nymphs and adults of *O. indicus*[3].

Recently, a serious outbreak of sorghum mite was observed at the Millet Breeding Station of this University in a popularly grown CO 26 sorghum cultivar. With a view to have some idea on the presence of natural enemies, the affected area was surveyed by adopting standard sampling methods[4]. By this method 25 plants were randomly selected and two leaves (preferably 5th and 6th) were observed on the middle in a leaf area of 1 cm^2. We looked for the presence of mite as well as any natural enemy.

The population of *O. indicus* ranged from 12 to 55/cm^2. A coccinellid beetle *Scymnus gracilis* Motsch. was seen feeding on the mites in large numbers. The population of the beetle ranged from 1–2 larvae per square centimeter and invariably one adult beetle was found per square centimeter. Observation on the entire single leaf for this predator showed a maximum number of 35 larvae and 90 adults and on an average 10 larvae, 15 pupae and 30 adults.

To study the predatory potential of *S. gracilis*, laboratory studies were conducted by allowing known number of eggs, nymphs and adults of mites to be fed by *S. gracilis* grubs and adults. The grubs of the beetle were found to feed voraciously on the eggs of *O. indicus*. The adult beetles preferred nymphs and adults of the mite.

A single grub was found to consume on an average 41.2 to 71.5 eggs/day. It took only 25 sec for consuming a single egg. A single adult beetle consumed as many as 40–50 mites/day including both nymphs and adults. The present investigation reveals the potential predatory nature, especially of the grub of *S. gracilis* on the eggs of *O. indicus* and the preference for nymphs and adults of the mite by the adult beetle. Hence, this predatory beetle can effectively be utilized in the biological control programme against sorghum mite, *O. indicus*.

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INFLUENCE OF PLANT AND ANIMAL FOOD ON FOOD UTILIZATION OF THE FRESHWATER CARP *LABEO ROHITA* (HAM.)

M. A. HANIFFA, A. G. MURUGESAN and A. T. FLEMING
Department of Zoology, St. Xavier's College, Palayamkottai 627 002, India.

Food intake, which determines rates and efficiencies of absorption and conversion[1,2] is influenced by both the quantity[3] and the quality[4,5] of food. While reports on the effects of carnivorous diets on food utilization of fishes are considerable[6,7] those on herbivorous/omnivorous diets are scanty. The present investigation deals with the influence of combination of plant and animal food on bioenergetics of the freshwater carp *Labeo rohita*.

Labeo rohita (3 ± 1 g live weight) were acclimated to the laboratory conditions and feeding schedule. Fortyfive glass jars (capacity 3 l) were taken and divided into 5 series and each was further divided into 3 groups (3 jars in each) and *L. rohita* were separately introduced into each jar. The first series (9 jars) of individuals were fed *ad libitum* on 100% plant diet viz: *Amaranthus spinosus, Amaranthus gangeticus* and *Spirogyra maxima*; the second series of *L. rohita* (9 jars) were fed on 100% animal diet (frog thigh muscle, freshwater mussel and goat liver) and the remaining 5 groups were fed on a combination of plant and animal diets (50:50). The test individuals (15 in number) were taken from the original stock dried at 80°C and weighed to measure the initial dry weight of the test individuals[8]. Every day a control sample of 5 g weight of each food was dried at 80°C and weighed and the water content of the different foods was estimated separately for presenting the energy budget values in dry weight. Unconsumed food was removed daily, dried and weighed. Faecal pellets were collected everyday, dried and weighed. The scheme of energy budget followed here is the slightly modified IBP formula[10] represented as follows: C (consumption) = p (growth) + R (metabolism) + F (faeces). The regime was conducted at 28 ± 2°C for 30 days and after that the fish were sacrificed and the weight changes were recorded.

Among the plant food, *L. rohita* showed greater affinity to feed on *S. maxima* (49 mg/g/day) than on *A. gangeticus* (41 mg/g/day) and on *A. spinosus* (29 mg/g/day). When compared with plant diet, the animal food (except in freshwater mussel) produced elevated values in feeding rate. When freshwater mussel alone was supplied the feeding rate was very low (15 mg/g/day). *S. maxima* in combination with goat liver and freshwater mussel yielded high values of 194 mg/g/day and 98 mg/g/day feeding rates respectively. Hence it is suggested that in the case of freshwater mussel and goat liver, the supplementation of plant food (*S. maxima*) accelerated food consumption, whereas in all other combinations supplementation of animal food enhanced food consumption. Working on the energy balance of the fish *Macropodus cupanus* fed on the combination of algal and animal food, Mathavan and Christopher[11] reported the maximum feeding in fish fed exclusively on animal food and the feeding rate declined steadily with increasing proportion of plant (algae) in the food.

L. rohita fed on pure *A. spinosus* showed the maximum conversion rate of 4.1 mg/g/day followed by those fed on pure *A. gangeticus* (2.2 mg/g/day) and pure *S. maxima* (1.8 mg/g/day). Among the animal food, growth rate was negative in the case of goat liver-fed individuals (− 4.9 mg/g/day and was the least in the case of those fed on freshwater mussel (0.5 mg/g/day). Supplementation of plant