Chapter III

NUTRITIVE VALUE AND UTILIZATION OF PASSION FRUIT SEED MEAL

The present study was divided into two parts:
1. Chemical composition of the seed meal.
2. Its growth promoting value.

1. CHEMICAL COMPOSITION: Employing the official methods of A.O.A.C., the results of analysis of seed meal, obtained after solvent extraction of the freshly crushed seeds, revealed a fair amount of variation. Only typical results are given below. Moisture, 9.8%; crude protein (N x 6.25) = 12.3%; Ether extract = 0.1%; Ash 1.58%; Crude Fiber = 55.9%; Carbohydrates (by difference) = 20.32%.

The above data showed that the meal was a fair source of protein and carbohydrates. Qualitative tests revealed the absence of alkaloids and cyanogenetic glucosides. However, the serious bottle-neck on its successful utilization was its high crude fiber content (composed mostly of the hard stone cells comprising the outer testa of the seeds), most of which was removable by means of mechanical sieving through 60 mesh sieves. The fine flour thus obtained was utilized for studies on its growth promoting value in young albino rats.

2. GROWTH PROMOTING VALUE: The experimental procedure was essentially the same as reported earlier in similar experiments on peel flour. 18 freshly weaned albino rats (weighing 44 to 53 g.) were divided into 3 comparable groups (each com-
prising 3 males and 3 females) in a randomised block system, blocks being formed on sex, littermate and weaning weights. In the 3 experimental diets, the rice in the South Indian Rice diet was replaced by the above seed meal at the following levels.

<table>
<thead>
<tr>
<th></th>
<th>Rice %</th>
<th>Seed meal %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I (Control)</td>
<td>78.50</td>
<td>0.00</td>
</tr>
<tr>
<td>Group II</td>
<td>70.65</td>
<td>7.85</td>
</tr>
<tr>
<td>Group III</td>
<td>62.80</td>
<td>15.70</td>
</tr>
</tbody>
</table>

Daily observations were made on the general health of the experimental animals during the experimental period of 8 weeks. Daily records of food intake and weekly gains in body weight of rats were kept. The results are presented in table 101.

**Table 101. EFFECT OF REPLACING RICE IN POOR SOUTH INDIAN RICE DIET BY PASSION FRUIT SEED MEAL ON THE GROWTH OF YOUNG ALCINO RATS DURING 8 WEEKS**

<table>
<thead>
<tr>
<th>No.</th>
<th>Composition of diets</th>
<th>Av. initial wt. (g/rat)</th>
<th>Av. weekly food intake (g/rat)</th>
<th>Av. weekly gain in body wt. (g/rat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Rice 78.50 Seed Meal 0.00</td>
<td>3M + 3F 48.0</td>
<td>68.9</td>
<td>5.4</td>
</tr>
<tr>
<td>II</td>
<td>76.65 7.85</td>
<td>3M + 3F 48.0</td>
<td>65.3</td>
<td>5.3</td>
</tr>
<tr>
<td>III</td>
<td>62.80 15.70</td>
<td>3M + 3F 48.7</td>
<td>59.7</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**Table 102. ANALYSIS OF VARIANCE OF GAINS IN BODY WEIGHTS OF EXPERIMENTAL ANIMALS OVER 8 WEEK PERIOD**

<table>
<thead>
<tr>
<th>Factors</th>
<th>D.F.</th>
<th>M.S. g²/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Blocks</td>
<td>5</td>
<td>1.639 N.S.</td>
</tr>
<tr>
<td>Between Diets</td>
<td>11</td>
<td>0.008 N.S.</td>
</tr>
<tr>
<td>Error</td>
<td>4</td>
<td>0.491</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

S.D. per animal = 0.70 g/week.
DISCUSSION: During the entire experimental period, all the animals in groups I and II ate well and were quite active and healthy except one male rat in group II which did not grow well. However, in group II, one of the animals died at the end of 6 weeks, while other did not grow well. Therefore, the data pertaining only to the first two groups, where uniform results were obtained, were subjected to statistical analysis by estimating by the "missing plot technique", the gain body/weight for one male rat, the growth of which, as reported earlier, was not satisfactory. The results of statistical analysis are presented in table 102.

There was no significant difference in the gain in body weight of rats between the control and the second group, indicating thereby that replacement of rice in poor rice diet to the extent of 10% by the prepared seed meal did not adversely affect the growth rate of rats.

The author wishes to thank Dr. R.K. Bhagawan, M.B.B.S. and Dr. T.R. Doraiswamy, for the medical examination of the experimental animals, Sri C.P. Kamasundara for the general assistance in the microscopic examination of blood of experimental animals and Mr. V. Sreenivasan for the maintenance of rats.
SUMMARY

1. Chemical composition of seeds: Passion fruit seeds were found to be a fair source of a semi-drying oil (23.35%), protein (11.13%), but very high in crude fiber content (55.72%).

2. Extraction, Physico-chemical composition, refining, bleaching and stability of passion fruit seed oil.

The oil recovery by solvent extraction ranged from 21.74 to 23.19%, while by cold extraction, 14.7 to 19.27%. Data on the composition, refining, and bleaching of oil are presented. The stability of the oil, as determined by the 'active oxygen method' was only 6.25 hours. The storage studies revealed that passion fruit seed oil was less stable than groundnut oil. Data on the changes in peroxide value and colour deterioration in oil stored at room temperature (24-30°C) and at 37°C have been presented.

3. Growth promoting value and digestibility of oil: Passion fruit oil was similar to groundnut oil with respect to growth rate, digestibility coefficient etc., when fed at 5% level in Poor South Indian Rice Diet and at 10% level in Synthetic Diet. The growth rate in hydrogenated passion fruit oil group was practically the same as in control and raw oil group, but the growth in all the above 3 groups was significantly less than that in Vanaspati (Dalda) group. The digestibility coefficient of hydrogenated oil was slightly lower than that in the raw oil or vanaspati.

4. Metabolism studies on raw and blended passion fruit oil:

Feeding of raw as well as blended oil (50:50 with raw groundnut oil), at 10% level in 15% casein diet, resulted in better retention of calcium and phosphorus as compared to the
fat free group. However, no appreciable difference was noticed in nitrogen assimilation, blood analyses, liver weights, their histology, moisture content and liver lipids, bone formation and ash content, etc., indicating thereby that both raw and blended passion fruit oil were almost similar to groundnut oil in the above aspects.

5. **Nutritive value and utilization of passion fruit seed meal.**

Chemical composition and growth-promoting value of seed meal are presented. Replacement of rice in the poor South Indian Rice Diet to the extent of 10% by the prepared seed meal (sieved through 60 mesh sieve) did not adversely affect the growth rate and general health of albino rats.

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**BIBLIOGRAPHY**


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