Vegetable protein for food and feed

II. Low fibre detoxified mustard seed meal as human food

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Abstract. Incorporation of low fibre detoxified mustard seed meal improved nutritive value of Pakistani dishes. Fortified dishes, on organoleptic evaluation, were considered acceptable.

Introduction

Pakistan produces 240 thousand tons of mustard/rape seed cakes every year and a further increase in their production is expected [1]. The cake which is a product left after the extraction of oil, has limited use in animal feed and the rest is either exported or used as fertilizer [2]. The cake contains as high as 45% crude protein [3]. Amino acid profile of the protein from mustard seed cake is comparable with animal protein and is better than that of most other vegetable proteins [2, 4]. However, the presence of toxic compounds makes it unfit for monogastric animals; and high fibre contents along with these toxins make the cake inedible.

Biological evaluation of detoxified mustard seed meal [5] did not show any adverse effect on liver, kidneys, spleen and heart of rats [3]. Low fibre detoxified mustard seed meal produced by Shah et al [6] had been used as a protein supplement in various Pakistani dishes. Food products thus prepared were chemically analysed for their nutritional value and were organoleptically evaluated for their acceptability.

Materials and methods

Detoxified mustard seed cake containing 4.96% fibre was prepared [6] from mustard seed cultivar RL-18 supplied by the Agricultural Research Institute, Faisalabad. Other food ingredients were purchased from the local market. All of the food products except cake [7], biscuits [8] and sauces [9] were prepared by traditional methods.

Low fibre detoxified mustard seed meal (LFDM) was added to the traditional foods at the rate of 5% (w/w basis).
The products included Shami Kabab (meat gram cutlets), Seikh Kabab (meat roll), Pakoras (fried gram flour balls), Allu Kabab (potato cutlets), Bari (spiced pulse balls), Cake, Biscuits, Missi Roti (spiced chapatti), Laddu (sweet balls of roasted gram flour), Dahi Bahrae (cultured milk gram cutlets), Gram Rice Maroonda (gram snack), Rice Maroonda (rice snack), Vinegar Mustard Sauce and Milk Mustard Sauce.

The ingredients included in the food products are reported in Table 1.

The control as well as the supplemented food products were analysed for protein, crude fibre, fat and ash contents by A.O.A.C. methods [10]. Organoleptic evaluation of the prepared food products was carried out following the sensory evaluation method of Krum [11]. The products were served to a panel of eight judges.

**Results and discussion**

*Supplementation of food products with low fibre detoxified mustard seed meal (LFDM)*

Incorporation of the detoxified mustard-seed cake in poultry rations and rat diets had indicated that up to sixty percent of animal proteins can be replaced by LFDM without any adverse effect [3]. The quality of the meal was further improved when its fibre contents were reduced to 4.96 and phytic acid to 0.52% [6]. This LFDM was incorporated at the level of 5% in various dishes. These foods were analysed for their chemical constituents after preparation (Table 2).

*Improvement in quality and quantity of protein on fortification with mustard seed meal*

Augmentation in the protein contents of various food products ranged from 6.59 to 227.27%. The maximum increase of 227.27% was observed in vinegar mustard sauce, whereas it was minimum (i.e., 6.59%) in 'seikh kebab' (Table 2). It is evident that the foods having low protein contents showed the maximum increase up on fortification with LFDM (Table 2). The foods containing meat, egg or pulses showed comparatively lesser increases in protein, up on fortification, than those which had low protein contents (sauce, ‘maroonda’).

In view of the balanced amino acid profile of LFDM, and its high biological value [3], the quality as well as quantity of the protein in the LFDM fortified foodstuff was improved.

*Organoleptic evaluation of detoxified mustard seed meal supplemented foods*

Consumer acceptability of the fortified food products is given in Table 3. On the basis of organoleptic evaluation these foods can be grouped into three categories. The first category is comprised of those foods for which the overall