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IMPACT OF HEAT TREATMENTS ON FUNCTIONAL PROPERTIES OF NIGER SEED

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Various functional properties of deoiled Niger seed cake of Ootakmond variety, such as emulsification capacity, foam capacity, foam stability, water absorption capacity, fat absorption capacity and the effect of dry heat and moist heat (autoclave) on above properties were studied. Emulsification, foam capacity and foam stability was reduced where as water absorption and fat absorption capacity was increased on heating.

Keywords: Functional property. Emulsification; Foam capacity; Foam stability; Fat absorption capacity; Water absorption capacity.

Functional properties are the attributes of proteins in different food system. Lots of work has been done on functional properties of different legumes and oilseeds but Niger seed remained unexplord. Functional properties are affected by a number of factors like, protein source, processing steps, including precipitation, drying concentration or chemical treatment (Kinsella 1976).

Seeds of ootakmond variety of Niger were obtained from Agricultural Research farm of Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur located at Chhindwara.

To study the effect of heat 250 g Niger seeds were grinded by electric mixer and oil was extracted by soxhlet extractor using petroleum ether (60-80°C). Thus obtained sample served as uutreated cake. 50 g of untreated cake was kept in oven at 100°C for 12 hours, allowed to cool at room temperature in dessicator which served as heat treated cake, whereas; 50 g of untreated cake autoclaved at 121°C at 15 lbs/sq. inch pressure for 15 minutes cooled in a dessicator, served as autoclaved cake. Thus obiained samples were analysed for the various functional properties.

Emulsification capacity of samples was determined the procedure of Beuchat *et al.* (1975). The procedure of Huffman *et al.* (1975) was used to deter mine the foam capacity and foam stabilising capacity. Water absorption capacity was measured according to the

procedure of Sosulski (1962). The fat absorption capacity was measured by the procedure pescribed by Sosulski *et al.* (1976).

The values of different properties like emulsification capacity, foaming capacity and foam stability of untreated, heat treated and autoclaved deoiled Niger cake were found 62 0, 51 5 and 46.0 ml/g; 59%, 50% and 46% and 154%, 148% and 142% respectively wherepas foam stability had standing of 10–60 minutes. The water absorption capacity and fat absorption capacity of untreated, heat treated and autoclaved sample were recorded 253.7, 658, 534 ml/100 g; and 192.5, 685 and 650 ml/100g of material respectively. In the present study the values of emulsification capacity, foam capacity and foam stability were found higher in untreated sample. However, water absorption and fat absorption capacity was highest in dry heat sample.

The higher value of emulsification capacity, foam capacity and foam stability in case of untreated sample might be due to higher hydrophilic lipophilic balance (HLB) of native proteins, since part of the protein molecule has an attraction for lipids; and this attraction force results in aggregation of the molecules. During heating, proteins get denatured which cause less availability of proteins to unit oil to be emulsified.

It has been suggested that foaming capacity and stability is directly related to the amount of the native proteins present. Native proteins have higher foaming capacity and stability than denatured proteins (Yasumatsu *et al*, 1972).

Dry heated sample showed higher value of water absorption and fat absorption capacity since proteins get denatured in heat. Since denatured proteins allow the molecules to aggregate and thus showed a high degree of hydration. Because of thermal treatments high molecular weight proteins are broken to polypeptides, which have higher water binding sites. Carbohydrates in food also play a role in water absorption and fat absorption capacity. During heating, gelatinization of carbohydrates and swelling of crude fibre may occur which could also lead to increased water absorption and fat absorption capacity. This increase could be due to both dissociation and denaturation of protein which is expected to unmask the nonpolar residues from the interior of the protein molecule, which ultimately leads to increase in the water absorption and fat absorption capacity.

Similar results were also reported. incase of soyflour, mung bean, winged bean, cowpea, mothbean and peanut by many workers (Yasumatsu *et al.*, 1972; del Rosario and Flores, 1981; Narayana Rao and Narasinga Rao, 1982; Kamath *et al.*, 1984; Padmashree *et al.*, 1987; Pawar and Ingle, 1988 and Rahma and Mostafa, (1988). They reported that autoclaving was

more effective in reducing emulsifying capacity and foaming capacity and stability.

In case of water absorption and fat absorption capacity, similar results were obtained by Nath and Narasinga Rao (1981) in soybean meal and guar-meal; del Rasario and Flores (1981) in blanched mungbean flour; Narayana Rao and Narasinga Rao (1982) in soy-flour and autoclaved winged bean flour Tompson *et al* (1982) in rapeseed flour, Tasneem *et al.*, (1982) in defatted soybean meal and guar meal, Kamath *et al.* (1984) in soybean and Pawar and Ingle (1988) in cooked moth bean.

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