

# STUDY OF PROTEIN CONTENT AND EFFECT OF pH VARIATION ON SOLUBILITY OF SEED PROTEIN OF ELEUSINE CORACANA (VARIETY DFM-1 AND HR-374)

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## Abstract

Protein utilization in the different food systems principally depend on their functional properties. The solubility behavior of the seed protein is of great importance from the several points of view. It determines their utility for many industrial purposes. Solubility is a critical functional property, since a protein generally has to be in solution in order to exert its other desirable functional characteristics. Nitrogen Solubility Index and Protein Dispersibility Index (PDI) are the two most common methods of evaluating solubility characteristics. Hence in this study seeds of Eleusine coracana (variety DFM-1 and HR-374) minor millet were studied for protein solubility at wide range of pH from 0.5 to 13.5.

**Keywords:** Protein solubility, Protein Dispersibility Index, Nitrogen Solubility Index, Minor millet Seeds, Variety of Eleusine coracana.

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## 1. INTRODUCTION

Millets are staple foods that supply a major portion of calories and protein to large segments of populations in the semi-arid tropical regions of Africa and Asia. Finger millet (Eleusine coracana) is the primary food source for millions of people in tropical dry land regions. It also has nutritional qualities superior to that of rice and is on par with wheat. It is also known as Finger millet or Ragi in India [1-2].

Nutritional and functional qualities of protein are largely determined by its amino acid content and nitrogen solubility. Nitrogen solubility is one aspect of hydration which is the most important characteristics in evaluating protein quality since many functional properties of protein depend upon their capacity to go into solution initially. Solubility is affected by many factors such as pH during extraction or solubilization, size of meal particle, temperature and meal solvent ratio, composition of solvent and character of protein [3].

## 2. MATERIALS AND METHODS

New hybrid, authentic, healthy and matured seeds of minor millets variety Eleusine coracana (variety DFM-1 & HR-374), under investigation were procured from Agriculture Research Station Dindori, regional extension of Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur (M.P.).

In the present investigation the seeds of Eleusine coracana (variety DFM-1 & HR-374) minor millet were analyzed for

their protein content and protein solubilization with pH variation in the powdered form, because size of seed powder has been shown to influence the nitrogenous extraction [4,5]. The seeds were sun dried and powdered to 60 meshes [6].

The effect of pH variation of the extractant on the protein solubilization were studied by varying pH of water, ranging from 0.5 to 13.5, brought by addition of hydrochloric acid or sodium hydroxide solution. One gram of the seed powder was suspended in 20 ml of extractant of desired pH. The contents were shaken in electrical shaker for about 2 hours at room temperature and centrifuged for 20 minutes at 2000 rpm in a centrifuge. The nitrogen solubilized was determined in supernatant so obtained by Semi-Micro Kjeldahl method [7].

## 3. RESULTS AND DISCUSSION

The seeds of Eleusine coracana (variety DFM-1 & HR-374) were studied for their protein solubility behaviors in considerable wide pH range from 0.5 to 13.5. The results of protein solubility are given in Table 1. These results are also graphically represented in Figure 1.1 to 1.2.

The determination of percent of total proteins (12.25 percent) of Eleusine coracana variety DFM-1 solubilized showed the maximum solubility (6.95 percent) at pH 12.0, while it was minimum (1.39 percent) at pH 2.0. At the remaining pH, solubility of the proteins was found to fluctuate between 1.405-4.84 percent.

The solubility of total seed proteins (11.66 percent) of Eleusine coracana variety HR-374 was found to be maximum (6.36 percent) at pH 12.0 and it was observed to be minimum (0.795 percent) at pH 2.0. The solubility of the proteins was found to fluctuate between 1.14-4.25percent at the remaining pH.

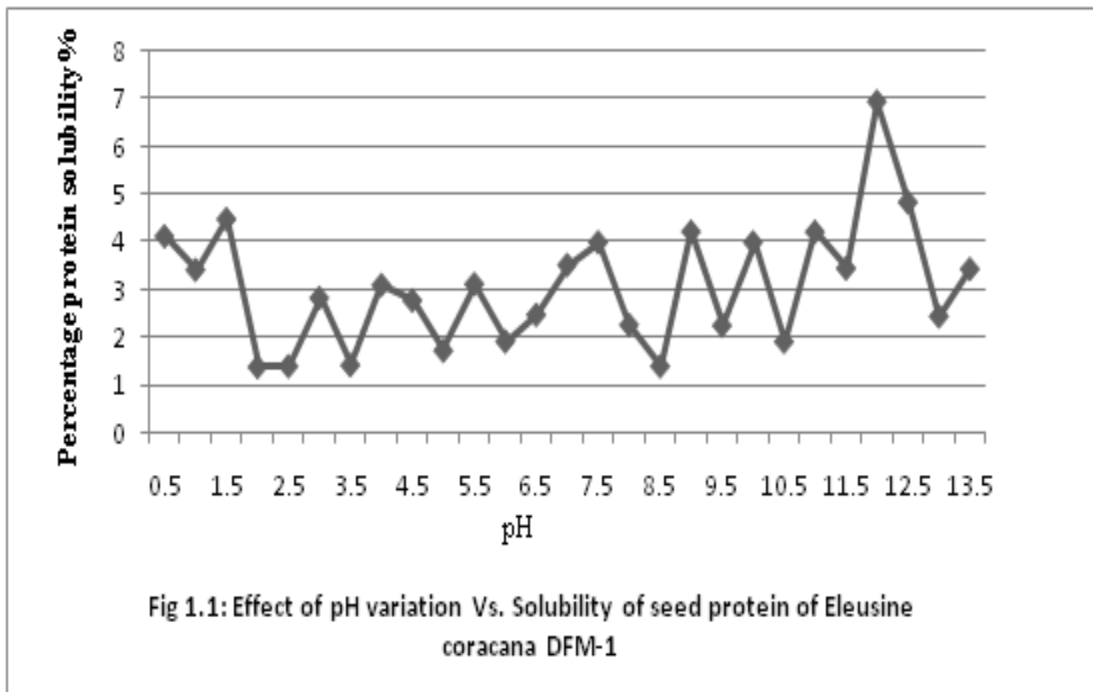
It was found that alkaline medium were more effective in extraction of protein from minor millets. As the acidity was increased, solubility drastically reduced rapidly and minimum is observed. This is isoelectric region.

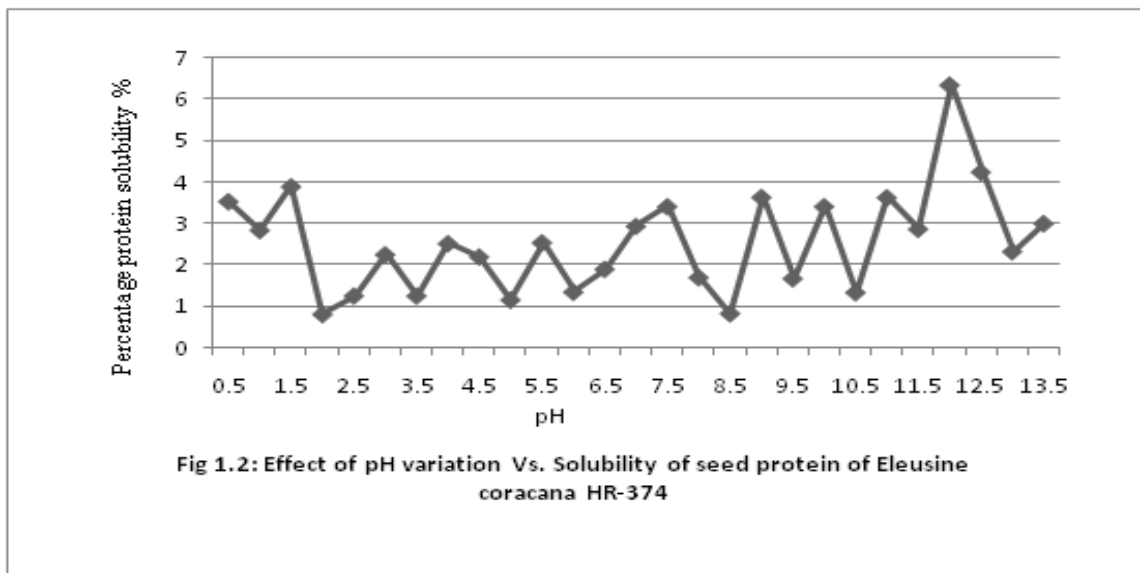
#### 4. CONCLUSIONS

Eleusine coracana (variety DFM-1 & HR-374) millets are fair sources of protein and protein quality is comparable to other millet proteins. In populations consuming these minor millets as staple food, these millets can contribute nearly 90% of their protein requirement at the present rate of consumption. Protein utilization in the different food systems principally depend on their functional properties. The solubility behavior of the seed protein is of great importance from the several points of view. It determines their utility for many industrial purposes and finds potential application in food products such as soups, beverage and food cakes, in which gelatin, emulsification and foaming properties are required.

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**Table1.** The effect of pH variation on the solubility of seed proteins of Eleusine coracana (Variety DFM-1&HR-374)

pH Value	Eleusine coracana DFM-1	Eleusine coracana HR-374
0.5	4.125	3.535
1.0	3.425	2.835
1.5	4.485	3.895
2.0	1.385	0.795
2.5	1.405	1.242
3.0	2.835	2.245
3.5	1.425	1.242
4.0	3.105	2.515
4.5	2.782	2.191
5.0	1.731	1.144
5.5	3.125	2.535
6.0	1.925	1.335
6.5	2.482	1.890
7.0	3.525	2.935
7.5	4.00	3.411
8.0	2.272	1.688
8.5	1.405	0.815
9.0	4.225	3.635
9.5	2.255	1.665
10.0	4.00	3.411
10.5	1.9155	1.325
11.0	4.221	3.63
11.5	3.455	2.865
12.0	6.950	6.362
12.5	4.841	4.25
13.0	2.451	2.32
13.5	3.441	3.00

\* The values given in the table are the mean of the triplicate values obtained.

## BIOGRAPHIES

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