

Assessment of hardness of water and its impact on cooking of dal

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Accepted : August, 2008

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ABSTRACT

This study was undertaken to assess the level of water hardness and its impact on time taken and fuel consumed to cook pigeonpea (Tur) dal and appearance and taste of cooked dal. Findings revealed that water from bore well recorded highest level of hardness and lowest level of hardness was seen in tap and well water. pH level of selected water also increased with an increase in the hardness of water. Mean scores of appearance and taste of dal cooked in different water were found to decrease with an increase in the hardness of water.

Key words : Hardness of water, Cooking dal, Time, Fuel, Pigeonpea.

Water which has been called the elixir of life is an important human need, as important as air which keeps man breathing. Man can live without clothes, shelter and food for some time but without water he will perish within half a week (Rajeswari and Devadas, 1969). The pure water available in the nature is colourless, odourless and tasteless and has a special attraction for the earth's minerals. When water comes into contact with them, many of them dissolve in the water which affect the colour, taste and cleaning ability of water. It also makes it injurious to health and many hazards result from taking polluted water (Sundaram, 1981). Hardness is the term commonly used to depict the impurities in water. In most cases, calcium and magnesium ions are responsible for water hardness. According to Bedi (1977) hardness of water is caused by certain salts held in solution, the most common are the carbonates, chlorides, sulphates of calcium and magnesium, water with hardness is unsuitable for cooking vegetables, meat and for making infusion to tea, coffee etc. Hence, the present study was undertaken to find out the hardness and pH value of water from different sources and its impact on cooking dal.

METHODOLOGY

Water samples were collected from different sources namely, distilled, tap, well and bore well from the randomly selected areas of Parbhani. Hardness of water was carried out by estimating calcium content of water by using flame photometer. The hardness of water was calculated as per the method suggested by Tandon (1993). pH of water was determined by using digital pH meter. pH meter (Systronic made) was standardized with the help of standard acidic (pH 4.0) and alkali (pH 9.2)

solutions. Then the pH of water sample was directly recorded (Tondon, 1993). For the cooking experiment a quantity of 100 g of pigeonpea (Tur) dal was taken and cooking was done by absorption method. Absorption method is the method of cooking pulse in just sufficient quantity of water where full water is absorbed by the cooked foods during the cooking process. The procedure for cooking dal was standardized before the actual experiment. Time required for cooking dal was recorded with the help of stop watch. The fuel consumption was determined by weighing the gas cylinder each time before and after cooking dal. The difference between two values was taken as amount of gas consumed. Sensory evaluation of dal was done by a trained panel of 10 judges selected through threshold test (Swaminathan, 1979). The experiment was carried out in triplicates. Complete randomized design technique was applied to see the difference in time, and fuel consumed for cooking dal, appearance and taste of dal cooked in different water.

RESULTS AND DISCUSSION

The level of hardness and pH of water from different sources are reported in Table 1. It is clear from the table that hardness and pH of the water ranged from 12 to 141 mg/lit and 7 to 8.9, respectively. Distilled water was found without any dissolved hardness and highest level of hardness of 141 mg/lit was recorded for bore well water. The level of hardness of tap and well water was soft and moderately soft as the recorded values were 12 and 30mg/lit, respectively, which is less than 40 (Rodier, 1975). Bore well water recorded hardness of 141 mg/lit which was very hard. Regarding pH of water samples collected from different sources it was revealed that

lowest pH of 7.00 was observed in distilled water, while highest pH of 8.9 was found in bore well water. As the concentration of salts of water increases, the alkalinity of water also increases, hence pH value of water was also found to increase with increase in the hardness level of water.

Table 1 : Hardness and pH value of the water from different sources

Types of water	Hardness (mg/ lit)	pH value
Distilled	00.00	7.00
Tap	12.00	7.88
Well	30.00	8.24
Bore well	141.00	8.90

Comparison of time taken, fuel consumed and mean scores of appearance and taste of dal cooked in water with varying levels of hardness is presented in Table 2.

It is evident from Table 2 that highest time (77.33 min) and fuel consumption (100 g) was seen in dal cooked in bore well water. Lowest time (32.80 min) and fuel (40.66) was consumed for cooking dal in distilled water. The increase in time consumption of dal cooked in bore well water was twice than that observed in tap and well water indicating that when dal was cooked in distilled,

Table 2: Comparison of time taken, fuel consumed, taste and appearance of dhal cooked in water with different levels of hardness

Types of water	Average time (min)	Fuel consumed (g)	Mean scores of	
			Appearance	Taste
Distilled	32.80	40.66	4.80	4.50
Tap	38.60	43.33	3.97	3.77
Well	38.00	43.67	4.12	3.86
Bore well	77.33	100.00	2.92	2.54
F value	-588.90**	2155.32**	63.00**	55.10**
S.E.±	0.88	1.72	0.1	0.1
C.D.	2.48	4.83	0.3	0.31

** indicate significance of value at P=0.01

tap and well water, around 50 per cent of time was saved. The fuel consumed ranged between 40.66g and 100 g in different waters. Highest fuel consumption (100 g) for dal cooked in bore well water was recorded while the lowest fuel consumption of 40.66g was observed when dal was cooked in distilled water. Fuel saving of around 60 per cent was observed when dal was cooked in distilled, tap and well water when compared with bore well water.

A gradual decrease was observed in the mean scores

of appearance and taste, as the level of hardness of water increased. The appearance and taste of dal cooked in tap water scored less but it increased when cooked in well water and subsequently decreased more when cooked in bore well water.

Statistical analysis revealed a highly significant difference between the four types of water in time and fuel consumed to cook. Dal cooked in bore well water consumed significantly highest time and fuel while dal cooked in distilled water required a significantly lower time and fuel. Dal cooked in bore well water scored significantly less for appearance and taste than dal cooked in other types of water. Dal cooked in distilled water scored significantly more than dal cooked in other types of water. The appearance and taste of dal cooked in tap and well water was at par with each other.

Conclusion:

From the findings of this study it can be concluded that level of hardness in water exerted a significant influence on the time taken, fuel consumed, appearance and taste of pigeonpea (Tur) dal cooked in water from different sources.

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