A Mathematical Model for Diet control Using Ranking of Decagonal Fuzzy Number

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Abstract - In this research we turn up with a ranking method based on decagonal fuzzy numbers in which the transportation norm like demand, supply and transportation cost are decagonal fuzzy numbers. Vogel's approximation method (VAM) in fuzzy analysis is used for obtaining fuzzy transportation problem to get fuzzy minimal solution. Decagonal fuzzy numbers show an exemplary nutrition value for the condiments and spices (fresh) diet with low cost. The condiments and spices (fresh) diet will generate nutrient- dense food and make people strong and healthy.

Keywords- Decagonal fuzzy number, Ranking function, Fuzzy transportation problem,Condiments, and spices in humanbalanced diet.

AMS Subject classification- 97A40, 90B06, 90C08, 90C70, 90C90, 97M40.

I. INTRODUCTION

Ranking of fuzzy plays a pivotal part. Fuzzy number of ranking is a fundamental form of calculating fuzzy data in optimization. The principle solution of application in ranking of generalized decagonal fuzzy number in transportation gives the value of cost in generalized decagonal fuzzy quantities. Zadeh[9] present theory of fuzzy and then different ranking techniques has been developed. Fuzzy represents data and information containing uncertainties. Dubois and prade[2] proposed operations on fuzzy number in the interval [0, 1]. Anushya, Ramaand and sudha[1] proposed transportation problem using intuitionistic decagonal fuzzy number. Felix and Victor Devadoss[3] proposed a new decagonal fuzzy number under uncertain linguistic environment. Jon arockiaraj and Sivasankari[5] proposed a decagonal fuzzy number and its vertex method. Saneifard[7] proposed a modified method for defuzzification by Probability density function. Virginraj and Hemavathi[8] proposed solving the decision making problem using decagonal fuzzy number and fuzzy matrix.

When we talk about nutritional content of foods, it should be related to cooked foods. Almost all foods consumed by human being are subject to cooking. Cooking practices may vary from one region to another in the country and even from one house to another. Even though we have wide range of cooking practices the use of condiments and spices(fresh) is almost same. Condiments and spices(fresh) are included daily in the food to improve its palatability. Condiments and spices contain iron, minerals, potassium, zinc, trace metals. Spices contain high level of tannin which may interfere with iron absorption and it also contain several pharmacologically active substances like choline, biogenic amines and they also have anti-bacterial property and inhibit petrifying bacteria.

Chillies(green), Coriander leaves, Garlic, Ginger and Onion (small) are the condiments and spices commonly used in every home irrespective of rural and urban. Condiments and Spices(fresh) deliver all kinds of vitamins, minerals, carbohydrates, proteins, calcium, β-carotene, potassium, tannin and iron. Condiments and Spices diet contribute essential health for all the human being. Chillies(green) provide carotene values and vitamins which is good for eyes, skin and internal system. Chillies(green) control blood sugar levels because it contains zero calorie value and with that it helps us to reduce weight. After eating chillies(green) it speeds up human metabolism. Chillies(green) are loaded with many oxidative deteriorations that cover the human body against free primitive. Coriander leaves are the leaves used traditionally in our cooking. Coriander leaves available in all parts of the country and it is edible fully. Coriander leaves are rich in thiamine, niacin, potassium, phosphorous, calcium, and protein. Coriander leaves contain vitamins and minerals. It is an outstanding cause of dietary fibre, iron and magnesium. Coriander leaves helps people to reduce their sodium intake. Garlic is a well-known substance in making food due to its heavy medical value. Garlic with a history of

several thousand years of human consumption and it gives high nutritive value. It cures common cold, reduce blood pressure, and prevent from the danger of heart disease. Garlic food be the medicine and medicine be the food. Garlic contains many health benefits and it is used to prevent cancer. Ginger is an essential root and it is a spice fight with germs and illness. If we take a small part of ginger daily in our food, it supports our overall health. Ginger lowers the imperil of cancer, diabetes, heart disease, blood sugar, muscle pain, stomach pain and joint pain. When we include ginger in our diet it keeps us healthy and strong. Onion(small) is the friend of heart health. Onion help us to reduce cholesterol levels, blood clots and it boost bone density and digestive health. Onions are a nutrient-dense food.

In this research paper, we intensify on condiments and spices(fresh), since it is mostly used for seasoning food preparation to improve the palatability. Condiments and spices(fresh) are rich in iron, trace metals and potassium. Chillies(green), coriander leaves, garlic, ginger, and onion (small)are the condiments and spices(fresh) taken in our diet plan. The ranking of generalized decagonal fuzzy number by Vogel's approximation method (VAM) is involved to get least amount of buying this condiments and spices(fresh) diet. The vitality of this research paper is to affirm the aim of health by using right and acceptable diet with minimal cost.

II. PRELIMINARIES

2.1 Definition: Decagonal Fuzzy Number

A fuzzy number $\tilde{A}_D$ is a decagonal fuzzy number denoted by $\tilde{A}_D = (a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9, a_{10})$ where a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9, a_{10} are real numbers and its membership function is given below,

$$\mu_{\tilde{A}_D}(x) = \begin{cases} \frac{1}{4}\frac{(x-a_1)}{(a_2-a_1)}, & a_1 \le x \le a_2 \\ \frac{1}{4}+\frac{1}{4}\frac{(x-a_2)}{(a_3-a_2)}, & a_2 \le x \le a_3 \\ \frac{1}{2}+\frac{1}{4}\frac{(x-a_3)}{(a_4-a_3)}, & a_3 \le x \le a_4 \\ \frac{3}{4}+\frac{1}{4}\frac{(x-a_4)}{(a_5-a_4)}, & a_4 \le x \le a_5 \\ 1, & a_5 \le x \le a_6 \\ 1-\frac{1}{4}\frac{(x-a_6)}{(a_7-a_6)}, & a_6 \le x \le a_7 \\ \frac{3}{4}-\frac{1}{4}\frac{(x-a_7)}{(a_8-a_7)}, & a_7 \le x \le a_8 \\ \frac{1}{2}-\frac{1}{4}\frac{(x-a_8)}{(a_9-a_8)}, & a_8 \le x \le a_9 \\ \frac{1}{4}-\frac{(x-a_9)}{(a_{10}-a_9)}, & a_9 \le x \le a_{10} \\ 0, & otherwise \end{cases}$$

2.2 Definition: Ranking of Decagonal Fuzzy Number

Fuzzy numbers directly get into the real line by using ranking method. Let $\tilde{A}_D$ be a generalized decagonal fuzzy number. The ranking of $\tilde{A}_D$ is denoted by R ($\tilde{A}_D$) and it is calculated as follows:

$$R(\tilde{A}_D) = \left[\frac{a_1 + 3a_2 + 5a_3 + 7a_4 + 9a_5 + 9a_6 + 7a_7 + 5a_8 + 3a_9 + a_{10}}{50}\right]$$

III. APPLICATION

In this research paper, we progress with condiments and spices such as chillies(green), coriander leaves, garlic, ginger, and onion(small) which gives good amount of protein, fats, total fibre, carbohydrates, and calcium. Real data were possessed and the quantum of nourishment food in the condiments and spices(fresh) were listed, from the nutrition value of Indian foods given by National Institute of Nutrition [4], Indian Food Composition tables [6]. Each condiments and spices(fresh)are taken, and their content of protein, fats, total fibre, carbohydrates and calcium is treated as decagonal fuzzy number respectively. The cost per 100 gm of each condiments and spices(fresh) is taken as supply and edible portion per 100 gm of each condiments and spices(fresh) is taken as demand.

The fuzzy transportation problem for condiments and spices(fresh) can be formulated in the following mathematical form

Min Z = R (2.27, 2.35, 2.43, 2.51,2.59, 2.67, 2.75, 2.83,2.91, 2.99) a_{11} +R (0.71, 0.71, 0.72, 0.72, 0.73, 0.73, 0.74, 0.74, 0.75, 0.75) a_{12} +R (4.21, 4.35, 4.49, 4.63, 4.77, 4.91, 5.05, 5.19, 5.33, 5.47) a_{13}+R(5.91, 6.00, 6.09, 6.18, 6.27, 6.36, 6.45, 6.54,6.63, 6.72) a_{14}+R (17.02, 18.59, 20.16, 21.73, 23.30, 24.87, 26.44, 28.01, 29.58, 31.15) a_{15} +R (3.26, 3.32, 3.38, 3.44,3.50, 3.56, 3.62, 3.68,3.74, 3.80) a_{21}+R (0.64, 0.65, 0.66, 0.67,0.68, 0.69, 0.70, 0.71,0.72, 0.73) a_{22} +R (4.42, 4.47, 4.52, 4.57,4.62, 4.67, 4.72, 4.77,4.82, 4.87) a_{23} +R (1.66, 1.72, 1.78, 1.84,1.90, 1.96, 2.02, 2.08, 2.14, 2.20) a_{24}+R (133.00, 135.89, 138.78, 141.67,144.56, 147.45, 150.34, 153.23,156.12, 159.01) a_{25}+R (6.72, 6.76, 6.80, 6.84,
6.88, 6.92, 6.96, 7.00,7.04, 7.08) a_{31}+R (0.14, 0.15, 0.15, 0.16,0.16, 0.17, 0.17, 0.18,
0.18, 0.18) a_{32} +R (4.81, 4.90, 4.99, 5.08,5.17, 5.26, 5.35, 5.44,5.53, 5.62) a_{33}+R (21.11, 21.29, 21.47, 21.65,21.83, 22.01, 22.19, 22.37,22.55, 22.73) a_{34} +R (14.35, 15.62, 16.89, 18.16,19.43, 20.70, 21.97, 23.24, 24.51, 25.78) a_{35}+R (2.06, 2.10, 2.14, 2.18, 2.22, 2.26, 2.30, 2.34, 2.38, 2.42) a_{41} +R (0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91) a_{42} +
R (4.96, 5.05, 5.14, 5.23, 5.32, 5.41, 5.50, 5.59, 5.68, 5.77) a_{43}+R (8.69, 8.75, 8.81, 8.87,
8.93, 8.99, 9.05, 9.11, 9.17, 9.23) a_{44} +R(16.01, 16.65, 17.29, 17.93, 18.57, 19.21, 19.85, 20.49, 21.13, 21.77)a_{45}+ R (1.62, 1.66, 1.70, 1.74, 1.78, 1.82, 1.86, 1.90, 1.94, 1.98) a_{51}+
R (0.15, 0.15, 0.16, 0.16, 0.16, 0.16, 0.17, 0.17, 0.17, 0.17) a_{52}+R (0.97, 1.01, 1.05, 1.09,
1.13, 1.17, 1.21, 1.25, 1.29, 1.33) a_{53}+R (11.21, 11.29, 11.37, 11.45,11.53, 11.61, 11.69, 11.77,11.85, 11.93) a_{54}+R (15.44, 16.44, 17.44, 18.44,19.44, 20.44, 21.44, 22.44,23.44, 24.44) a_{55}.

Let $\tilde{A}_D$ be a generalized decagonal fuzzy number. The ranking of $\tilde{A}_D$ is denoted by R ($\tilde{A}_D$) and it is calculated as follows:

$$R(\tilde{A}_D) = \left[\frac{a_1 + 3a_2 + 5a_3 + 7a_4 + 9a_5 + 9a_6 + 7a_7 + 5a_8 + 3a_9 + a_{10}}{50}\right]$$

$R(\tilde{A}_D) = \frac{1}{50}[131.50] = 2.63$
$R(\tilde{A}_D) = \frac{1}{50}[176.50] = 3.53$
$R(\tilde{A}_D) = \frac{1}{50}[345] = 6.90$
$R(\tilde{A}_D) = \frac{1}{50}[112] = 2.24$
$R(\tilde{A}_D) = \frac{1}{50}[90] = 1.80$
$R(\tilde{A}_D) = \frac{1}{50}[36.50] = 0.73$
$R(\tilde{A}_D) = \frac{1}{50}[34.50] = 0.69$
$R(\tilde{A}_D) = \frac{1}{50}[8] = 0.16$
$R(\tilde{A}_D) = \frac{1}{50}[43.50] = 0.87$
$R(\tilde{A}_D) = \frac{1}{50}[8] = 0.16$
$R(\tilde{A}_D) = \frac{1}{50}[242] = 4.84$
$R(\tilde{A}_D) = \frac{1}{50}[232.50] = 4.65$
$R(\tilde{A}_D) = \frac{1}{50}[261] = 5.22$

$R(\tilde{A}_D) = \frac{1}{50}[268.50] = 5.37$
$R(\tilde{A}_D) = \frac{1}{50}[57.50] = 1.15$
$R(\tilde{A}_D) = \frac{1}{50}[316] = 6.32$
$R(\tilde{A}_D) = \frac{1}{50}[96.50] = 1.93$
$R(\tilde{A}_D) = \frac{1}{50}[1096] = 21.92$
$R(\tilde{A}_D) = \frac{1}{50}[448] = 8.96$
$R(\tilde{A}_D) = \frac{1}{50}[578.50] = 11.57$
$R(\tilde{A}_D) = \frac{1}{50}[1204.50] = 24.09$
$R(\tilde{A}_D) = \frac{1}{50}[7300.50] = 146.01$
$R(\tilde{A}_D) = \frac{1}{50}[1003.50] = 20.07$
$R(\tilde{A}_D) = \frac{1}{50}[944.50] = 18.89$
$R(\tilde{A}_D) = \frac{1}{50}[997] = 19.94$

Supply

$R(\tilde{A}_D) = \frac{1}{50}[43.50] = 0.87$
$R(\tilde{A}_D) = \frac{1}{50}[11] = 0.22$
$R(\tilde{A}_D) = \frac{1}{50}[154] = 3.08$
$R(\tilde{A}_D) = \frac{1}{50}[44] = 0.88$
$R(\tilde{A}_D) = \frac{1}{50}[29.50] = 0.59$

Demand

$R(\tilde{A}_D) = \frac{1}{50}[51.50] = 1.03$
$R(\tilde{A}_D) = \frac{1}{50}[6.50] = 0.13$
$R(\tilde{A}_D) = \frac{1}{50}[58.50] = 1.17$
$R(\tilde{A}_D) = \frac{1}{50}[165] = 3.30$
$R(\tilde{A}_D) = \frac{1}{50}[0.50] = 0.01$

Table.3.1 Nutrition content for food items

Foods	Protein	Fat	Total Fibre	Carbohydrates	Calcium	Supply (cost of Edible portion of food stuff per 100 gm)
Chillies (green)	(2.27, 2.35, 2.43, 2.51, 2.59, 2.67, 2.75, 2.83, 2.91, 2.99)	(0.71, 0.71, 0.72, 0.72, 0.73, 0.73, 0.74, 0.74, 0.75, 0.75)	(4.21, 4.35, 4.49, 4.63, 4.77, 4.91, 5.05, 5.19, 5.33, 5.47)	(5.91, 6.00, 6.09, 6.18, 6.27, 6.36, 6.45, 6.54, 6.63, 6.72)	(17.02, 18.59, 20.16, 21.73, 23.30, 24.87, 26.44, 28.01, 29.58, 31.15)	(0.79, 0.81, 0.83, 0.84, 0.86, 0.88, 0.90, 0.92, 0.94, 0.96)
Coriander leaves	(3.26, 3.32, 3.38, 3.44, 3.50, 3.56, 3.62, 3.68, 3.74, 3.80)	(0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71 0.72, 0.73)	(4.42, 4.47, 4.52, 4.57, 4.62, 4.67, 4.72, 4.77, 4.82, 4.87)	(1.66, 1.72, 1.78, 1.84, 1.90, 1.96, 2.02, 2.08, 2.14, 2.20)	(133.00, 135.89, 138.78, 141.67, 144.56, 147.45, 150.34, 153.23, 156.12, 159.01)	(0.20, 0.21, 0.21, 0.21, 0.22, 0.22, 0.22, 0.23, 0.23, 0.24)
Garlic	(6.72, 6.76, 6.80, 6.84, 6.88, 6.92, 6.96, 7.00, 7.04, 7.08)	(0.14, 0.15, 0.15, 0.16, 0.16, 0.17, 0.17, 0.18, 0.18, 0.18)	(4.81, 4.90, 4.99, 5.08, 5.17, 5.26, 5.35, 5.44, 5.53, 5.62)	(21.11, 21.29, 21.47, 21.65, 21.83, 22.01, 22.19, 22.37, 22.55, 22.73)	(14.35, 15.62, 16.89, 18.16, 19.43, 20.70, 21.97, 23.24, 24.51, 25.78)	(2.95, 2.98, 3.01, 3.04, 3.07, 3.09, 3.10, 3.15, 3.18, 3.21)
Ginger	(2.06, 2.10, 2.14, 2.18, 2.22, 2.26, 2.30, 2.34, 2.38, 2.42)	(0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91)	(4.96, 5.05, 5.14, 5.23, 5.32, 5.41, 5.50, 5.59, 5.68, 5.77)	(8.69, 8.75, 8.81, 8.87, 8.93, 8.99, 9.05, 9.11, 9.17, 9.23)	(16.01, 16.65, 17.29, 17.93, 18.57, 19.21, 19.85, 20.49, 21.13, 21.77)	(0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92)
Onion (small)	(1.62, 1.66, 1.70, 1.74, 1.78, 1.82, 1.86, 1.90, 1.94, 1.98)	(0.15, 0.15, 0.16, 0.16, 0.16, 0.16, 0.17, 0.17, 0.17, 0.17)	(0.97, 1.01, 1.05, 1.09, 1.13, 1.17, 1.21, 1.25, 1.29, 1.33)	(11.21, 11.29, 11.37, 11.45, 11.53, 11.61, 11.69, 11.77, 11.85, 11.93)	(15.44, 16.44, 17.44, 18.44, 19.44, 20.44, 21.44, 22.44, 23.44, 24.44)	(0.56, 0.57, 0.57, 0.58, 0.58, 0.59, 0.60, 0.60, 0.61, 0.62)
Demand (cost of nutrition per 100 gm)	(0.97, 0.99, 1.00, 1.01, 1.03, 1.04, 1.05, 1.07, 1.08, 1.09)	(0.12, 0.12, 0.12, 0.12, 0.12, 0.12, 0.12, 0.13, 0.13, 0.13)	(1.06, 1.08, 1.11, 1.13, 1.16, 1.18, 1.20, 1.23, 1.25, 1.27)	(3.17, 3.20, 3.23, 3.26, 3.29, 3.32, 3.34, 3.37, 3.40, 3.43)	(0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01)	

Table 3.2: Fuzzy transportation problem after applying ranking technique

Foods	Protein	Fat	Total Fibre	Carbohydrates	Calcium	Supply
Chillies(green)	2.63	0.73	4.84	6.32	24.09	0.87
Coriander leaves	3.53	0.69	4.65	1.93	146.01	0.22
Garlic	6.90	0.16	5.22	21.92	20.07	3.08
Ginger	2.24	0.87	5.37	8.96	18.89	0.88
Onion(small)	1.80	0.16	1.15	11.57	19.94	0.59
Demand	1.03	0.13	1.17	3.30	0.01	5.64

Table 3.3: Optimum solution by Vogel's Approximation method

Foods	Protein	Fat	Total Fibre	Carbohydrates	Calcium	Supply
Chillies(green)	2.63	0.73	4.84	**0.87** 6.32	24.09	0.87
Coriander leaves	3.53	0.69	4.65	**0.22** 1.93	146.01	0.22
Garlic	**1.03** 6.90	**0.13** 0.16	**0.58** 5.22	**1.33** 21.92	**0.01** 20.07	3.08
Ginger	2.24	0.87	5.37	**0.88** 8.96	18.89	0.88
Onion(small)	1.80	0.16	**0.59** 1.15	11.57	19.94	0.59
Demand	1.03	0.13	1.17	3.30	0.01	5.64

Table 3.4: Defuzzification

Foods	Protein	Fat	Total Fibre	Carbohydrates	Calcium	Supply (cost of Edible portion of food stuff per 100 gm)
Chillies (green)	(2.27, 2.35, 2.43, 2.51, 2.59, 2.67, 2.75, 2.83, 2.91, 2.99)	(0.71, 0.71, 0.72, 0.72, 0.73, 0.73, 0.74, 0.74, 0.75, 0.75)	(4.21, 4.35, 4.49, 4.63, 4.77, 4.91, 5.05, 5.19, 5.33, 5.47)	**(0.79, 0.81, 0.83, 0.84,0.86, 0.88, 0.90, 0.92,0.94, 0.96)** (5.91, 6.00, 6.09, 6.18, 6.27, 6.36, 6.45, 6.54, 6.63, 6.72)	(17.02, 18.59, 20.16, 21.73, 23.30, 24.87, 26.44, 28.01, 29.58, 31.15)	(0.79, 0.81, 0.83, 0.84, 0.86, 0.88, 0.90, 0.92, 0.94, 0.96)
Coriander leaves	(3.26, 3.32, 3.38, 3.44, 3.50, 3.56, 3.62, 3.68, 3.74, 3.80)	(0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.70, 0.71 0.72, 0.73)	(4.42, 4.47, 4.52, 4.57, 4.62, 4.67, 4.72, 4.77, 4.82, 4.87)	**(0.20, 0.21, 0.21, 0.21,0.22, 0.22, 0.22, 0.23,0.23, 0.24)** (1.66, 1.72, 1.78, 1.84, 1.90, 1.96, 2.02, 2.08, 2.14, 2.20)	(133.00, 135.89, 138.78, 141.67, 144.56, 147.45, 150.34, 153.23, 156.12, 159.01)	(0.20, 0.21, 0.21, 0.21, 0.22, 0.22, 0.22, 0.23, 0.23, 0.24)
Garlic	**(0.97, 0.99, 1.00, 1.01,1.03, 1.04, 1.05, 1.07,1.08, 1.09)** (6.72, 6.76, 6.80, 6.84, 6.88, 6.92, 6.96, 7.00, 7.04, 7.08)	**(0.12, 0.12, 0.12,0.12,0.12, 0.12, 0.12, 0.13,0.13, 0.13)** (0.14, 0.15, 0.15, 0.16, 0.16, 0.17, 0.17, 0.18, 0.18, 0.18)	**(0.17, 0.26, 0.35, 0.44, 0.53, 0.62, 0.71, 0.80, 0.89, 0.98)** (4.81, 4.90, 4.99, 5.08, 5.17, 5.26, 5.35, 5.44, 5.53, 5.62)	**(0.51, 0.69, 0.87, 1.05, 1.23, 1.41, 1.59, 1.77, 1.95, 2.13)** (21.11, 21.29, 21.47, 21.65, 21.83, 22.01, 22.19, 22.37, 22.55, 22.73)	**(0.01, 0.01,0.01,0.01,0.01, 0.01,0.01,0.01,0.01,0.01)** (14.35, 15.62, 16.89, 18.16, 19.43, 20.70, 21.97, 23.24, 24.51, 25.78)	(2.95, 2.98, 3.01, 3.04, 3.07, 3.09, 3.10, 3.15, 3.18, 3.21)
Ginger	(2.06, 2.10, 2.14, 2.18, 2.22, 2.26, 2.30, 2.34, 2.38, 2.42)	(0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91)	(4.96, 5.05, 5.14, 5.23, 5.32, 5.41, 5.50, 5.59, 5.68, 5.77)	**(0.83, 0.84, 0.85, 0.86,0.87, 0.88, 0.89, 0.90,0.91, 0.92)** (8.69, 8.75, 8.81, 8.87, 8.93, 8.99, 9.05, 9.11, 9.17, 9.23)	(16.01, 16.65, 17.29, 17.93, 18.57, 19.21, 19.85, 20.49, 21.13, 21.77)	(0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.90, 0.91, 0.92)
Onion (small)	(1.62, 1.66, 1.70, 1.74, 1.78, 1.82, 1.86, 1.90, 1.94, 1.98)	(0.15, 0.15, 0.16, 0.16, 0.16, 0.16, 0.17, 0.17, 0.17, 0.17)	**(0.56, 0.57, 0.57, 0.58,0.58, 0.59, 0.60, 0.60,0.61, 0.62)** (0.97, 1.01, 1.05, 1.09, 1.13, 1.17, 1.21, 1.25, 1.29, 1.33)	(11.21, 11.29, 11.37, 11.45, 11.53, 11.61, 11.69, 11.77, 11.85, 11.93)	(15.44, 16.44, 17.44, 18.44, 19.44, 20.44, 21.44, 22.44, 23.44, 24.44)	(0.56, 0.57, 0.57, 0.58, 0.58, 0.59, 0.60, 0.60, 0.61, 0.62)
Demand (cost of nutrition per 100 gm)	(0.97, 0.99, 1.00, 1.01, 1.03, 1.04, 1.05, 1.07, 1.08, 1.09)	(0.12, 0.12, 0.12, 0.12, 0.12, 0.12, 0.12, 0.13, 0.13, 0.13)	(1.06, 1.08, 1.11, 1.13, 1.16, 1.18, 1.20, 1.23, 1.25, 1.27)	(3.17, 3.20, 3.23, 3.26, 3.29, 3.32, 3.34, 3.37, 3.40, 3.43)	(0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01, 0.01)	

The total minimum cost for Condiments and Spices(fresh) is

Min Z = (6.32) (0.87) + (1.93) (0.22) + (6.90) (1.03) + (0.16) (0.13) + (5.22) (0.58) + (21.92) (1.33) + (20.07) (0.01) + (8.96) (0.88) + (1.15) (0.59)

Min Z = Rs.53.99

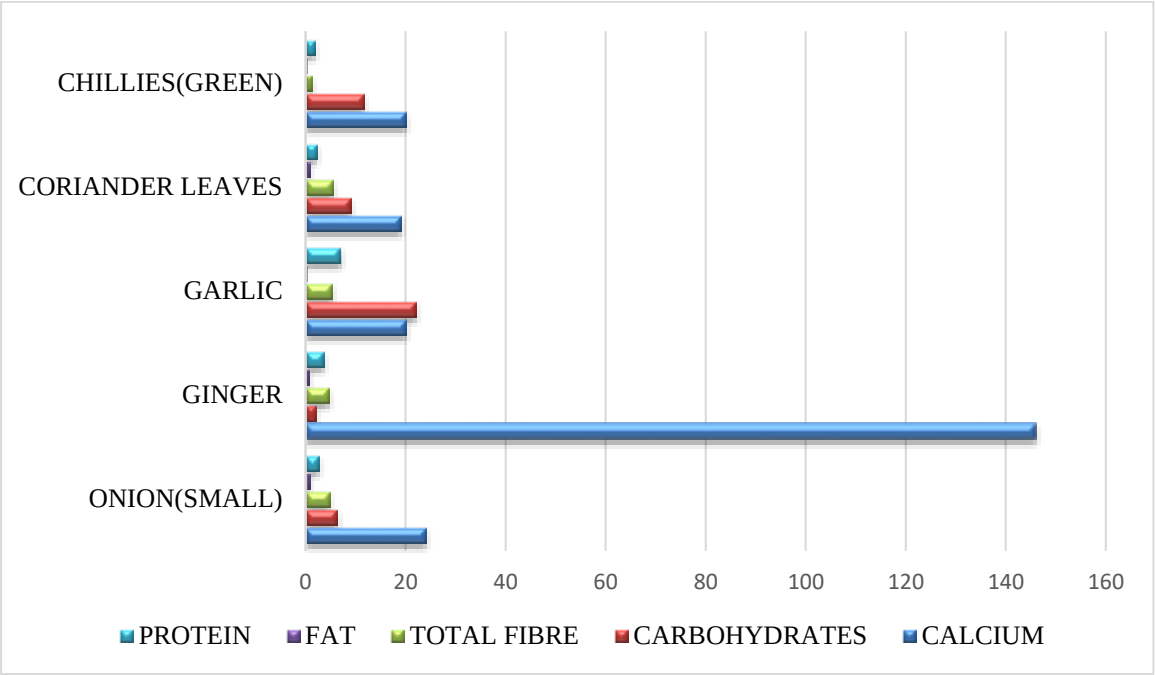

Fig. 3.1: Maximum daily condiments and spices diet plan for 2000 calories a day

IV. CONCLUSION

In this research paper, we see the importance of condiments and spices(fresh) and by applying ranking of decagonal fuzzy number, minimal cost is attained for the diet that we are using daily in our life. Condiments and spices(fresh) are obvious to have considerable health benefits, it also provides proteins, fats, total fibre, carbohydrates, and calcium. Their importance lies in the fact that they improve the flavour and acceptability of cooked food preparations and make them more appetising. The integral function of this paper is to constitute the attention of the people to show active principles present in spices and condiments act on the viscous membranes of mouth, stomach and intestines and stimulate the secretion of digestive juices. This paper encouraged us to price out the diet segment of condiments and spices(fresh) and with the support of fuzzy transportation problem we get a fresh and healthful diet with minimal cost.

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