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A mathematical model for nutrient requirements using ranking of Dodecagonal fuzzy numbers

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Abstract

In this paper, we discuss with a ranking method based on dodecagonal fuzzy numbers in which the transportation norm like demand, supply and transportation cost are dodecagonal fuzzy numbers. Zero Suffix method in fuzzy analysis is used for obtaining fuzzy transportation problem to get fuzzy minimal solution. Dodecagonal fuzzy numbers show an exemplary nutrition value for roots and tubers with low cost. An optimal solution for the edible items with sufficient nutritious requirements at the lowest cost is obtained.

Keywords

Dodecagonal fuzzy number, Fuzzy transportation problem, Ranking function, Zero Suffix method, Vitamins, Roots and Tubers.

AMS Subject Classification

97A40, 90B06, 90C08, 90C70, 90C90, 97M40.

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1. Introduction

The transportation problem is one of the essential applications of linear programming problems which deal with the distribution of single product from different sources of supply to various destination of demand in such a technique that the total transportation cost is minimized. Thamarai selvi and Srividhya [11] presented the concept of a replacement method for solving fuzzy transportation problem using dodecagonal fuzzy numbers. In real world, there are many problems deals with uncertainty in parameters, then cannot apply the normal method to solve the transportation problem, but we can solved it by using fuzzy methods which depend upon ranking function to find the optimal solution for transportation problems. The fuzzy transportation problems connect between fuzzy set theory, ranking function and transportation problems, which mean that the supply, demand and total transportation cost are fuzzy numbers. Iden Hasan Hussein and Anfal Hasan Dheyab [3] proposed the concept of a new algorithm using ranking function to find solution for fuzzy transportation problem.

Nutrition may be an important role of health and development and malnourishment in every form presents major pressures to human health [10]. The transportation cost of Roots and Tubers plays a vital role and here it is represented as fuzzy transportation problem such that the total transportation cost should be minimum. A simple definition for nutrition is the examination of food that enters the body and its process in the functioning of the organs in the body.

Nutrtion is the assimilation by living organism of food materials which make them grow, function and reproduce. Food composition table is usually used for assessing nutrient values. To calculate the fabrication of menus and recipes of the food, the information of food formation is required. The nutrition guidance is based on information from food composition diaries kept by the users were they record all foods they consume. The table of food composition are authorised database prescribed by Indian council of medical research department of health research [2], [6].

Father of fuzzy mathematical logic Lotfi A. Zadeh [13] introduced the concept of fuzzy sets to deal with imprecision, vagueness in real life situations. Ranking of fuzzy number play an important role in transportation problems. Centroid idea in ranking fuzzy number started in the year of 1981 by Yager [12]. We have find an optimum solution for the fuzzy transportation problem of minimal cost using the fuzzy dodecagonal parameters is in the form of linear programming problem and resolve it by the Zero suffix method for the food elements. Jatinder pal singh and Neha Ishesh Thakur [5] presented a ranking of generalized dodecagonal fuzzy numbers using centroid to centroids. The main objective of this study is to raise the level of vitamins in the human body through the food things and also to minimize the cost.

2. Preliminaries

Definition 2.1 (Dodecagonal Fuzzy Numbers)**.** *A fuzzy number*

$$B = (v_1, v_2, v_3, v_4, v_5, v_6, v_7, v_8, v_9, v_{10}, v_{11}, v_{12})$$

is said to be a Dodecagonal fuzzy number [4,7,9] *if it has the following membership function. Graphically, the dodecagonal fuzzy number has a dodecagonal shape with twelve vertices as depicted in Fig 1.*

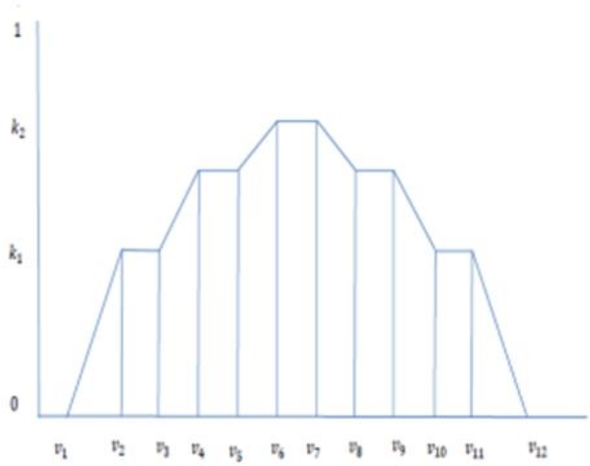

Figure 1. Graphical representation of Dodecagonal fuzzy number

$$\mu_B(X) = \begin{cases} 0, & x \le v_1 \\ k_1 \frac{x-v_1}{v_2-v_1}, & v_1 \le x \le v_2 \\ k_1, & v_2 \le x \le v_3 \\ k_1 + (1-k_1)\frac{x-v_3}{v_4-v_3}, & v_3 \le x \le v_4 \\ k_2, & v_4 \le x \le v_5 \\ k_2 + (1-k_2)\frac{x-v_5}{v_6-v_5}, & v_5 \le x \le v_6 \\ 1, & v_6 \le x \le v_7 \\ k_2 + (1-k_2)\frac{v_8-x}{v_8-v_7}, & v_7 \le x \le v_8 \\ k_2, & v_8 \le x \le v_9 \\ k_1 + (1-k_1)\frac{v_{10}-x}{v_{10}-v_9}, & v_9 \le x \le v_{10} \\ k_1, & v_{10} \le x \le v_{11} \\ k_1 \frac{v_{12}-x}{v_{12}-v_{11}}, & v_{11} \le x \le v_{12} \\ 0, & v_{12} \le x \end{cases}$$

where, $0 < k_1 < k_2 < 1$.

Definition 2.2. *The Ranking function of the generalized Dodecagonal Fuzzy Number* [5],

$$B = (v_1, v_2, v_3, v_4, v_5, v_6, v_7, v_8, v_9, v_{10}, v_{11}, v_{12}; w),$$

which maps the set of all fuzzy numbers to a set of real numbers is defined as

$$R(B) = \left\{ \left[\frac{2(a_1 + a_6 + a_7 + a_{12}) + 6(a_2 + a_3 + a_4 + a_9)}{54} \right] + \left[\frac{6(a_{10} + a_{11})}{54} \right] + \left[\frac{5(a_5 + a_8)}{54} \right] \right\} \cdot \left[\frac{25w}{81} \right]$$

3. Proposed Ranking Method of Dodecagonal Fuzzy Numbers

Various effective approaches for the ranking of fuzzy numbers are suggested within the paper. We state another ranking method of general dodecagonal fuzzy number is proposed using Centroid of Centroids. That is for every

$$(v_1, v_2, v_3, v_4, v_5, v_6, v_7, v_8, v_9, v_{10}, v_{11}, v_{12}) \in F(R),$$

the ranking function $R : F(R) \to R$. where $F(R)$ could also be a group of fuzzy numbers defined on set of real numbers which maps every fuzzy number in to a real number. The ranking of V is denoted by $R(V)$ and it is mathematically calculated as follows:

$$R(V) = \left\{ \left[\frac{2(a_1 + a_6 + a_7 + a_{12}) + 6(a_2 + a_3 + a_4 + a_9)}{54} \right] + \left[\frac{6(a_{10} + a_{11})}{54} \right] + \left[\frac{5(a_5 + a_8)}{54} \right] \right\} \cdot \left[\frac{80}{81} \right].$$

4. Algorithm of The Zero Suffix Method

The procedure of the zero suffix method [8] for finding an optimum solution of transportation problem involves of the following stages.

Stage 1: To form the transportation table for the given transportation problem and check the balanced state. If not, convert in to balance one.

Stage 2: Subtract every row entries of the transportation table from the row minimum.

Stage 3: Subtract each column entries of the resulting transportation table after using the stage 2 from the column minimum.

Stage 4: In the reduced cost table there will be at least one zero in each row and column, then find the suffix value of all the zeros in the reduced cost table by following simplification the suffix value denoted by

$$w = \frac{\text{Add the costs of nearest adjacent sides of zero}}{\text{Number of costs Added}}.$$

Stage 5: Choose the maximum of W, if it has one maximum value then supply to that demand corresponding to the cell. If it has more equal values then select $\{a_i, b_j\}$ and supply to that demand maximum possible.

Stage 6: After stage 5, the exhausted column or row are to be trimmed. If $\{a_i = b_j\}$, strike out either i^{th} row or j^{th} column but not both. The resultant table must possess at least one zero is each row and each column, else repeat stage 2 and stage 3.

Stage 7: Repeat Stage 4 to Stage 6 until the optimal cost is obtained.

5. Application

Nutrition is additionally fundamental to the upkeep of excellent health and functionality. Good nutrition may be a prerequisite for good health. Food plays a crucial role in our lives and is closely related to our existence. It's probably one among the foremost important needs of our lives. Our body contains very small quantity of vitamins however; it will be surprised to understand that they are liable for all the main functions of the body.

All foods contain some essential stuff which performs important functions in our body. These necessary substances contributed by our food are called nutrients. Here we study the vitamins Niacin, Riboflavin, Biotin and Thiamine, in Roots and Tubers like, Beet Root, Carrot, potato and Tapioca. The data were collected and therefore the quantity of food supplements within the food products were documented, from the food composition Diaries [2], and Nutritive rate of Indian foods given by National Institute of Nutrition [6].

The minimum, normal and maximum content of vitamins Thiamine, Riboflavin, Niacin and Biotin in foods Beet Root, Carrot, potato and Tapioca is taken in to account as dodecagonal fuzzy number. The cost per 100 mg of edible portion of every food stuff is taken as supply and the cost of nutrients per 100 mg of every vitamin is taken as demand. The Fuzzy transportation problem for roots and Tubers be formulated in the following mathematical form

$$\begin{aligned}
\min z &= R(0.0090, 0.0092, 0.0094, 0.0096, 0.0098, 0.0100,\\
&\quad 0.0102, 0.0104, 0.0106, 0.0108, 0.0110, 0.0112)a_{11}\\
&+ R(0.0080, 0.0084, 0.0088, 0.0092, 0.0096, 0.0100,\\
&\quad 0.0104, 0.0108, 0.0112, 0.0116, 0.0120, 0.0124)a_{12}\\
&+ R(0.2000, 0.2018, 0.2036, 0.2054, 0.2072, 0.2090,\\
&\quad 0.2108, 0.2126, 0.2144, 0.2162, 0.2180, 0.2198)a_{13}\\
&+ R(2.3700, 2.4045, 2.4390, 2.4735, 2.5080, 2.5425,\\
&\quad 2.5770, 2.6115, 2.6460, 2.6805, 2.7150, 2.7495)a_{14}\\
&+ R(0.0230, 0.0261, 0.0292, 0.0323, 0.0354, 0.0385,\\
&\quad 0.0416, 0.0447, 0.0478, 0.0509, 0.0540, 0.0571)a_{21}\\
&+ R(0.0140, 0.0169, 0.0198, 0.0227, 0.0256, 0.0285,\\
&\quad 0.0314, 0.0343, 0.0372, 0.0401, 0.0430, 0.0459)a_{22}\\
&+ R(0.2000, 0.2091, 0.2182, 0.2273, 0.2364, 0.2455,\\
&\quad 0.2546, 0.2637, 0.2728, 0.2819, 0.2910, 0.3001)a_{23}\\
&+ R(1.1600, 1.1855, 1.2110, 1.2365, 1.2620, 1.2875,\\
&\quad 1.3130, 1.3385, 1.3640, 1.3895, 1.4150, 1.4405)a_{24}\\
&+ R(0.0560, 0.0567, 0.0574, 0.0581, 0.0588, 0.0595,\\
&\quad 0.0602, 0.0609, 0.0616, 0.0623, 0.0630, 0.0637)a_{31}\\
&+ R(0.0090, 0.0092, 0.0094, 0.0096, 0.0098, 0.0100,\\
&\quad 0.0120, 0.0104, 0.0106, 0.0108, 0.0110, 0.0112)a_{32}\\
&+ R(0.9000, 0.9255, 0.9510, 0.9765, 1.0020, 1.0275,\\
&\quad 1.0530, 1.0785, 1.1040, 1.1295, 1.1550, 1.1805)a_{33}\\
&+ R(1.1800, 1.2109, 1.2418, 1.2727, 1.3036, 1.3345,\\
&\quad 1.3654, 1.3963, 1.4272, 1.4581, 1.4890, 1.5199)a_{34}\\
&+ R(0.0670, 0.0675, 0.0680, 0.0685, 0.0690, 0.0695,\\
&\quad 0.0700, 0.0705, 0.0710, 0.0715, 0.0720, 0.0725)a_{41}\\
&+ R(0.0190, 0.0192, 0.0194, 0.0196, 0.0198, 0.0200,\\
&\quad 0.0202, 0.0204, 0.0206, 0.0208, 0.0210, 0.0212)a_{42}\\
&+ R(0.4400, 0.4418, 0.4436, 0.4454, 0.4472, 0.4490,\\
&\quad 0.4508, 0.4526, 0.4544, 0.4562, 0.4580, 0.4598)a_{43}\\
&+ R(1.8400, 1.8564, 1.8728, 1.8892, 1.9056, 1.9220,\\
&\quad 1.9384, 1.9548, 1.9712, 1.9876, 2.0040, 2.0204)a_{44}.
\end{aligned}$$

The Nutrition content for each food item is given in Table. 1.

Table 1. Fuzzy transportation of Nutrients in food substances

Food	Thiamine B_1	Riboflavin B_2	Niacin B_3	Biotin B_7	Supply (cost of Edible portion of food stuff per 100 mg)
Beet Root	(0.0090,0.0092, 0.0094,0.0096, 0.0098,0.0100, 0.0102,0.0104, 0.0106,0.0108, 0.0110,0.0112)	(0.0080,0.0084, 0.0088,0.0092, 0.0096,0.0100, 0.0104,0.0108, 0.0112,0.0116, 0.0120,0.0124)	(0.2000,0.2018, 0.2036,0.2054, 0.2072,0.2090, 0.2108,0.2126, 0.2144,0.2162, 0.2180,0.2198)	(2.3700,2.4045, 2.4390,2.4735, 2.5080,2.5425, 2.5770,2.6115, 2.6460,2.6805, 2.7150,2.7495)	(0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001)
Carrot	(0.0230,0.0261, 0.0292,0.0323, 0.0354,0.0385, 0.0416,0.0447, 0.0478,0.0509, 0.0540,0.0571)	(0.0140,0.0169, 0.0198,0.0227, 0.0256,0.0285, 0.0314,0.0343, 0.0372,0.0401, 0.0430,0.0459)	(0.2000,0.2091, 0.2182,0.2273, 0.2364,0.2455, 0.2546,0.2637, 0.2728,0.2819, 0.2910,0.3001)	(1.1600,1.1855, 1.2110,1.2365, 1.2620,1.2875, 1.3130,1.3385, 1.3640,1.3895, 1.4150,1.4405)	(0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001)
Potato	(0.0560,0.0567, 0.0574,0.0581, 0.0588,0.0595, 0.0602,0.0609, 0.0616,0.0623, 0.0630,0.0637)	(0.0090,0.0092, 0.0094,0.0096, 0.0098,0.0100, 0.0120,0.0104, 0.0106,0.0108, 0.0110,0.0112)	(0.9000,0.9255, 0.9510,0.9765, 1.0020,1.0275, 1.0530,1.0785, 1.1040,1.1295, 1.1550,1.1805)	(1.1800,1.2109, 1.2418,1.2727, 1.3036,1.3345, 1.3654,1.3963, 1.4272,1.4581, 1.4890,1.5199)	(0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001)
Tapioca	(0.0670,0.0675, 0.0680,0.0685, 0.0690,0.0695, 0.0700,0.0705, 0.0710,0.0715, 0.0720,0.0725)	(0.0190,0.0192, 0.0194,0.0196, 0.0198,0.0200, 0.0202,0.0204, 0.0206,0.0208, 0.0210,0.0212)	(0.4400,0.4418, 0.4436,0.4454, 0.4472,0.4490, 0.4508,0.4526, 0.4544,0.4562, 0.4580,0.4598)	(1.8400,1.8564, 1.8728,1.8892, 1.9056,1.9220, 1.9384,1.9548, 1.9712,1.9876, 2.0040,2.0204)	(0.0001,0.0001, 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001 0.0001,0.0001)
Demand (cost of nutrition per 100 mg)	(0.0000,0.0000, 0.0000,0.0000, 0.0000,0.0000, 0.0000,0.0000, 0.0000,0.0000, 0.0000,0.0000)	(0.0000,0.0000, 0.0000,0.0000, 0.0000,0.0000, 0.0000,0.0000, 0.0000,0.0000, 0.0000,0.0000)	(0.0001,0.0001, 0.0001,0.0001, 0.0001,0.0001, 0.0001,0.0001, 0.0001,0.0001, 0.0001,0.0001)	(0.0003,0.0003, 0.0003,0.0003, 0.0003,0.0003 0.0003,0.0003, 0.0003,0.0003 0.0003,0.0003)	-

The fuzzy transportation problem for food supplement content of food items can be formulated in the following mathematical form

$$R(V) = \left[\frac{2(a_1+a_6+a_7+a_{12})+6(a_2+a_3+a_4+a_9+a_{10}+a_{11})+5(a_5+a_8)}{54}\right]\cdot\left[\frac{80}{81}\right]$$

$$R(v) = \left[\frac{2(0.0090+0.0100+0.0102+0.0112)+6(0.0092+0.0094+0.0096+0.0106+0.0108+0.0110)+5(0.0098+0.0104)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0100$$

$$R(v) = \left[\frac{2(0.0080+0.0100+0.0104+0.0124)+6(0.0084+0.0088+0.0092+0.0112+0.0116+0.0120)+5(0.0096+0.0108)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0101$$

$$R(v) = \left[\frac{2(0.2000+0.2090+0.2108+0.2198)+6(0.2018+0.2036+0.2054+0.2144+0.2162+0.2180)+5(0.2072+0.2126)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.2073$$

$$R(v) = \left[\frac{2(2.3700+2.5425+2.5770+2.7495)+6(2.4045+2.4390+2.4735+2.6460+2.6805+2.6805)+5(2.5080+2.6115)}{54}\right]\cdot\left[\frac{80}{81}\right] = 2.5281$$

$$R(v) = \left[\frac{2(0.0230+0.0385+0.0416+0.0571)+6(0.0261+0.0292+0.0323+0.0478+0.0509+0.0540)+5(0.0354+0.0447)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0396$$

$$R(v) = \left[\frac{2(0.0140+0.0285+0.0314+0.0459)+6(0.0169+0.0198+0.0227+0.0314+0.0401+0.0430)+5(0.0256+0.0343)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0296$$

$$R(v) = \left[\frac{2(0.2000+0.2455+0.2546+0.3001)+6(0.2091+0.2182+0.2273+0.2728+0.2819+0.2910)+5(0.2364+0.2637)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.2470$$

$$R(v) = \left[\frac{2(1.1600+1.2875+1.3130+1.4405)+6(1.1855+1.2110+1.2365+1.3640+1.3895+1.4150)+5(1.2620+1.3385)}{54}\right]\cdot\left[\frac{80}{81}\right] = 1.2842$$

$$R(v) = \left[\frac{2(0.0090+0.0100+0.0102+0.0112)+6(0.0092+0.0094+0.0096+0.0106+0.0108+0.0110)+5(0.0098+0.0104)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0100$$

$$R(v) = \left[\frac{2(0.9000+1.0275+1.0530+1.1805)+6(0.9255+0.9510+0.9765+1.1040+1.1295+1.1550)+5(1.0020+1.0785)}{54}\right]\cdot\left[\frac{80}{81}\right] = 1.0274$$

$$R(v) = \left[\frac{2(0.0670+0.0695+0.0700+0.0725)+6(0.0675+0.0680+0.0685+0.0710+0.0715+0.0720)+5(0.0690+0.0705)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0689$$

$$R(v) = \left[\frac{2(0.4400+0.4490+0.4508+0.4598)+6(0.4418+0.4436+0.4454+0.4544+0.4562+0.4580)+5(0.4472+0.4526)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.4443$$

$$R(v) = \left[\frac{2(1.8400+1.9220+1.9384+2.0204)+6(1.8564+1.8728+1.8892+1.9712+1.9876+2.0040)+5(1.9056+1.9548)}{54}\right]\cdot\left[\frac{80}{81}\right] = 1.9064$$

Supply

$$R(v) = \left[\frac{2(0.0001+0.0001+0.0001+0.0001)+6(0.0001+0.0001+0.0001+0.0001+0.0001+0.0001)+5(0.0001+0.0001)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0001$$

$$R(v) = \left[\frac{2(0.0001+0.0001+0.0001+0.0001)+6(0.0001+0.0001+0.0001+0.0001+0.0001+0.0001)+5(0.0001+0.0001)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0001$$

$$R(v) = \left[\frac{2(0.0001+0.0001+0.0001+0.0001)+6(0.0001+0.0001+0.0001+0.0001+0.0001+0.0001)+5(0.0001+0.0001)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0001$$

$$R(v) = \left[\frac{2(0.0001+0.0001+0.0001+0.0001)+6(0.0001+0.0001+0.0001+0.0001+0.0001+0.0001)+5(0.0001+0.0001)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0001$$

Demand

$$R(v) = \left[\frac{2(0.0000+0.0000+0.0000+0.0000)+6(0.0000+0.0000+0.0000+0.0000+0.0000+0.0000)+5(0.0000+0.0000)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0000$$

$$R(v) = \left[\frac{2(0.0000+0.0000+0.0000+0.0000)+6(0.0000+0.0000+0.0000+0.0000+0.0000+0.0000)+5(0.0000+0.0000)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0000$$

$$R(v) = \left[\frac{2(0.0001+0.0001+0.0001+0.0001)+6(0.0001+0.0001+0.0001+0.0001+0.0001+0.0001)+5(0.0001+0.0001)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0001$$

$$R(v) = \left[\frac{2(0.0003+0.0003+0.0003+0.0003)+6(0.0003+0.0003+0.0003+0.0003+0.0003+0.0003)+5(0.0003+0.0003)}{54}\right]\cdot\left[\frac{80}{81}\right] = 0.0003$$

Table 2. Fuzzy transportation problem after applying ranking method

Food	Thiamine (B_1)	Riboflavin (B_2)	Niacin (B_3)	Biotin (B_7)	Supply
Beet Root	0.0100	0.0101	0.2073	2.5281	0.0001
Carrot	0.0396	0.0296	0.2470	1.2842	0.0001
Potato	0.0591	0.0100	1.0274	1.3333	0.0001
Tapioca	0.0689	0.0199	0.4443	1.9064	0.0001
Demand	0.0000	0.0000	0.0001	0.0003	0.0004

Table 3. Optimum solution by Zero Suffix method

Food	Thiamine (B_1)	Riboflavin (B_2)	Niacin (B_3)	Biotin (B_7)	Supply
Beet Root	0.0000 0.0100	0.0101	0.0001 0.2073	0.0000 2.5281	0.0001
Carrot	0.0396	0.0296	0.2470	0.0001 1.2842	0.0001
Potato	0.0591	0.0100	1.0274	0.0001 1.3333	0.0001
Tapioca	0.0689	0.0199	0.4443	0.0001 1.9064	0.0001
Demand	0.0000	0.0000	0.0001	0.0003	-

The total minimum cost for food supplements in balanced diet is

$$\text{Min}\,Z = (0.0000)(0.0100)+(0.0000)(0.0100)+(0.0001)(0.2073)+(0.0000)(2.5281) + (0.0001)(1.2842)+(0.0001)(1.3333)+(0.0001)(1.9064)$$

$$\text{Min}\,Z = \text{Rs}\,0.0005 \text{ per } 100mg \text{ per day.}$$

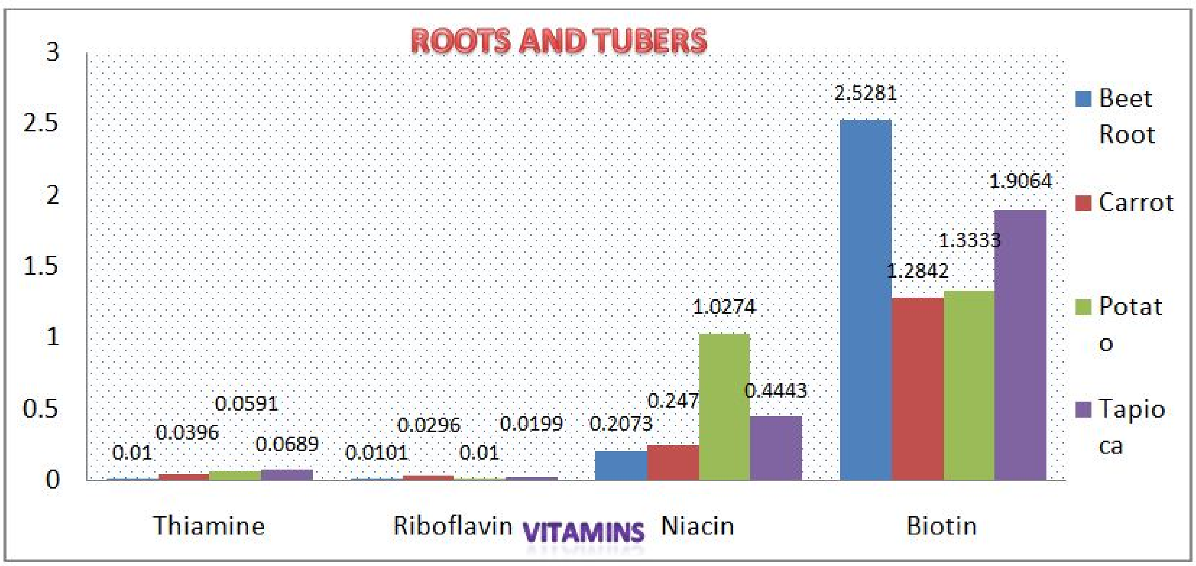

Figure 2. Graphical representation of vitamins in food stuffs

6. Conclusion

We considered the Roots and Tubers having nutrient content as transportation cost, cost of vitamins per 100 mg as supply, cost of edible portion of food stuffs per 100 mg as demand and each has considered as dodecagonal fuzzy numbers. The optimum cost of food items with rich nutrition value was obtained using fuzzy transportation by Zero suffix method. The study aim at increase the level of vitamin in human body by the input of food items and also aims at minimizing the total consumable cost. The result will enable all the people to enjoy a balanced vitamin that might help them have healthiness and welfare.

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