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## Impact assessment of training on value added spinach products for healthy living

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### Abstract

Spinach is considered as a superfood because it possesses loads of nutrients and low in calories. This leafy veggie also benefits your skin, hair and bones. Spinach is linked to numerous health benefits that improve your eyesight, cancer prevention and regulate blood sugar. One vegetable with so many health benefits is amazing and our ancestors were not wrong in propagating its uses for the human body. So adding this green to the diet will benefit your health in multiple ways. Therefore, the present study was conducted during 2021-22 in Shahnal and Hasanga villages of Fatehabad district with the objectives to assess the Impact Assessment of Training on Value Added Spinach Products for healthy living. Forty respondents from two villages attended the training on spinach products. Four spinach products *viz*: Burger with spinach tikki, Spinach kabab, Spinach soup and Spinach biryani were taught with the help of lectures cum result demonstration. The results highlighted the facts that maximum knowledge gain was observed in spinach soup i.e. 85.0 percent followed by spinach kabab (77.50%), burger with spinach tikki (75.0%) and (62.5%) percent knowledge gain was observed in importance of spinach in the diet and spinach biryani respectively. All the spinach products were liked by the respondents in terms of color, taste, texture, flavor and appearance.

**Keywords:** Spinach, products, nutritive, healthy, sensory evaluation

### Introduction

Most of the rural women directly or indirectly are involved in agriculture activities in addition to their household duties. It has been observed by researchers that during peak season they may be forced to give less weightage to their food needs which adversely impacts not only their health but also adversely reflects on the health of their children (Vemireddy and Pingali, 2021) [3]. As the popular saying goes 'Vocal for Local' it is imperative to create awareness among rural masses specially women for utilization of seasonal produce like spinach which are rich source of micronutrients like iron,  $\beta$  carotene and also fibres. It is well documented that regular utilization of spinach is helpful in combating hidden hunger and particularly vitamin A deficiency and iron deficiency anaemia. It is observed that children may not have liking for spinach products in the form as they are traditionally consumed like simple spinach vegetable. Several researchers have found and emphasized the need for creating awareness among people for utilizing seasonal, nutritious and low cost food items. It is well researched that nutrition education programmes, skill trainings and adoption of improved and refined innovative technologies by masses is a step towards bring quantifiable changes in the health status of people (Murty *et al.*, 2016) [1]. It is important to empower women with skills to prepare nutritious dietary spinach based alternatives for adding variety to the snacks made from spinach. There is need to offer innovation in the utilization of spinach in the form of alternative recipes like Spinach Soup, Spinach Biryani, Burger with spinach tikkie, and Hara Bhara Kabab. Keeping this in view three days training was imparted to rural women to create awareness among them on nutritional and dietary aspects of spinach and, preparation of spinach products i.e. Spinach Soup, Spinach Biryani, Burger with Spinach tikkie, and Hara Bhara Kabab.

### Materials and Methods

#### Selection of locale and respondents

The study was conducted in two villages namely Hasanga and Shanel of Ratia block in Fatehabad district. Sample comprised of 40 rural women (20 from each village).

#### Training for preparation of value added products of Spinach

Three days training was imparted to 40 rural women (20 from each village) on four selected

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spinach products viz; Burger with spinach *tikkie*, spinach *kabab*, spinach soup and spinach *biryani* were taught with the help of lectures cum result demonstration.

**Organoleptic acceptability, skill acquisition and adoption feasibility**

At the end of the demonstration all the prepared sample products were distributed among the trainees for the purpose of sensory evaluation and organoleptic testing. It was done on five different parameters viz; colour, texture, taste, flavour and appearance.

**Statistical design/ methods**

Frequency, percentage and effectiveness indices were used to draw the inferences.

**Results and discussion**

The results of the study highlight the facts that in village Hasanga majority of the respondents i.e. 55 percent belonged to middle age group i.e. 29-39 years of age, 65.0 percent had nuclear family, 40.0 percent were educated upto middle level, 70.0 percent respondents were earning their livelihood through agriculture and 55.0 percent respondents were having annual income between Rs. 3 lacks - Rs. 5

lacks /- respectively. In village Shanel majority of the rural women i.e. 70 percent were belonged to younger age group i.e. 18- 28 years, 70.0 percent had nuclear family, 35.0 percent were educated upto middle level and equal number were educated upto matriculation level, 65.0 percent were having agriculture as their main occupation and 45.0 percent respondents were having annual income between Rs. 3-5 lakhs, respectively

**Knowledge gain of respondents for spinach products**

The data regarding knowledge gain of respondents for spinach products is presented in Table 1. The presented data shows that maximum knowledge gain was observed in spinach soup i.e. 85.0 percent followed by spinach *kabab* (77.50%), burger with spinach *tikkie* (75.0%) and 62.5 percent knowledge gain was observed in importance of spinach in the diet and spinach *biryani*, respectively. Similar findings were reported by Prost *et al.* (2022) that imparting nutrition education to rural women through participatory videos and women's group meetings on agriculture and maternal and child nutrition increased women's knowledge, motivation and confidence to improve their and their children's diets.

**Table 1:** Knowledge gain of respondents for spinach products (n=40)

Sr. No.	Training aspect	Pre-exposure F (%)	Post-exposure F (%)	Knowledge gain F (%)
1.	Importance of Spinach in the Diet	11(27.5)	37(92.5)	26(65.0)
2.	Burger with spinach <i>Tikkie</i>	04(10.0)	34(85.0)	30(75.0)
3.	Spinach <i>Kabab</i>	06(15.0)	37(92.5)	31(77.5)
4.	Spinach Soup	0 (00)	34(85.0)	34(85.0)
5.	Spinach <i>Biryani</i>	11(27.5)	37(92.5)	26(65.0)
		Pre-Mean Scores	Post Mean Scores	't' value
		0.80	4.48	12.3*
Significant at 5%level				

The data presented in Table 2 shows the sensory evaluation of burger with spinach *tikkie* by rural women of village Hasanga and Shanel. The result highlighted the facts that the color of spinach *tikki* was ranked 1<sup>st</sup>, followed by taste, flavor and appearance (2<sup>nd</sup> rank) and texture got the 3<sup>rd</sup> rank

respectively. The weighted scores presented in the table highlighted that all the five parameters viz; colour, texture, taste, flavour and appearance of burger with spinach *tikkie* was rated between somewhat appreciable to appreciable.

**Table 2:** Sensory evaluation of burger with spinach *tikkie*

Characters	Appreciable (3)	Somewhat appreciable (2)	Not appreciable (1)	Total score	Mean score	Rank
Colour	26(78)	11(22)	3(3)	103	2.6	I
Texture	23(69)	9(18)	8(8)	95	2.4	III
Taste	25(75)	11(22)	4(4)	101	2.5	II
Flavor	24(72)	12(24)	4(4)	100	2.5	II
Appearance	26(78)	8(16)	6(6)	100	2.5	II

The data presented in Table 3 shows the Sensory evaluation of spinach *kabab* by rural women of village Hasanga and Shanel. The result highlighted the facts that the taste of spinach *kabab* was ranked Ist, followed by texture, flavor and appearance (2<sup>nd</sup> rank) and colour got the 3<sup>rd</sup>rank

respectively. The weighted scores presented in the table highlighted that all the five parameters viz; colour, texture, taste, flavour and appearance of spinach *kabab* was rated between somewhat appreciable to appreciable.

**Table 3:** Sensory evaluation of spinach *kabab*

Characters	Appreciable (3)	Somewhat appreciable (2)	Not appreciable (1)	Total score	Mean score	Rank
Colour	24(72)	9(18)	7(7)	97	2.4	III
Texture	26(78)	8(16)	6(6)	100	2.5	II
Taste	28(84)	9(18)	3(3)	105	2.6	I
Flavour	27(81)	8(16)	5(5)	102	2.5	II
Appearance	25(75)	9(18)	6(6)	99	2.5	II

The data presented in Table 4 shows the sensory evaluation of spinach soup by rural women of village Hasanga and Shanel. The result highlighted the facts that the taste and flavour of spinach soup was ranked 1st and colour, texture and appearance got the 2<sup>nd</sup> rank respectively. The weighted

scores presented in the table highlighted that all the five parameters viz; colour, texture, taste, flavour and appearance of soup was rated between somewhat appreciable to appreciable.

**Table 4:** Sensory evaluation of spinach soup

Characters	Appreciable (3)	Somewhat Appreciable (2)	Not Appreciable (1)	Total score	Mean score	Rank
Colour	24(72)	9(18)	07(7)	97	2.4	II
Texture	23(69)	11(22)	06(6)	97	2.4	II
Taste	23(69)	9(18)	08(8)	95	2.3	I
Flavor	22(66)	9(18)	09(9)	93	2.3	I
Appearance	23(69)	10(20)	07(7)	96	2.4	II

The data presented in Table 5 shows the Sensory evaluation of spinach *biryani* by rural women of village Hasanga and Shanel. The result highlighted the facts that the taste of spinach *biryani* was ranked 1st, followed by flavor (2<sup>nd</sup> rank), colour and appearance got the (3<sup>rd</sup> rank) and texture

got the 4<sup>th</sup> rank respectively. The weighted scores presented in the table highlighted that all the five parameters viz; colour, texture, taste, flavour and appearance of spinach *biryani* was rated between somewhat appreciable to appreciable.

**Table 5:** Sensory evaluation of spinach *biryani*

Characters	Appreciable (3)	Somewhat appreciable (2)	Not appreciable (1)	Total score	Mean score	Rank
Colour	26 (78)	14 (28)	0 (0)	101	2.65	III
Texture	23 (69)	8 (16)	3 (3)	94	2.20	IV
Taste	29 (93)	9 (18)	0 (0)	111	2.70	I
Flavor	28 (87)	8 (18)	2 (2)	107	2.67	II
Appearance	29 (87)	8 (16)	3 (3)	106	2.65	III

The data presented in Table 6 shows the comparative sensory evaluation of all the spinach products viz; Burger with spinach *tikkie*, spinach *kabab*, spinach soup and spinach *biryani* by rural women of village Hasanga and Shanel. The data presented in the table revealed that there

was not much variation in the mean scores. This means all the spinach products were liked by the respondents in terms of color, taste, texture, flavor and appearance.

**Table 6:** Comparative sensory mean scores of spinach products

Characters	Burger with Spinach <i>Tikkie</i>	Spinach <i>Kabab</i>	Spinach Soup	Spinach <i>Biryani</i>	Rank
Colour	2.4	2.4	2.4	2.65	III
Texture	2.4	2.4	2.4	2.20	IV
Taste	2.3	2.3	2.3	2.70	I
Flavor	2.3	2.3	2.3	2.67	II
Appearance	2.4	2.4	2.4	2.65	III

The data presented in Table 7 depicts the skill acquisition of respondents which was observed on three parameters. The data revealed that 65.00 percent of the respondents reported they can prepare burger with spinach *tikkie* without any difficulty, followed by 22.50 percent respondents who can prepare with somewhat difficulties and 12.50 percent respondents were unable to make burger with spinach *tikkie*

respectively. In case of spinach *kabab* 67.50 percent respondents reported that they can prepare spinach *kabab* without any difficulty, 27.50 percent of the respondents agreed that they can prepare with somewhat difficulties whereas only 5.0 respondents said that they can't prepare spinach *kabab*.

**Table 7:** Skill Acquisition of Spinach Product (n=40)

S. No.	Activity	Can prepare without difficulty F (%)	Can prepare with somewhat difficulties F (%)	Cannot prepare F (%)
1	Burger with Spinach <i>Tikkie</i>	26 (65.0)	09 (22.5)	05 (12.5)
2	Spinach <i>Kebab</i>	27 (67.5)	11 (27.5)	02 (5.0)
3	Spinach Soup	23 (57.5)	11 (27.5)	06 (15.0)
4	Spinach <i>Biryani</i>	27 (67.5)	13 (32.5)	0 (00)

However for spinach soup respondents reported that 57.50 percent can prepare the spinach soup without any difficulty, followed by 27.50 percent respondents who can prepare with somewhat difficulties and 15.0 percent of respondents said that they can't prepare the spinach soup. Regarding spinach *biryani* 67.50 percent of the respondents reported

that they can prepare spinach *biryani* without any difficulty and 32.50 percent respondents who can prepare with somewhat difficulty.

**Conclusion**

Spinach is easily available in rural areas in winters and is a

local green leafy vegetable grown in the kitchen gardens by rural women. Popularization of spinach based tasty snacks among rural women and their children is a good approach to empower them with the health benefits of this super food. Adoption of these nutritious and tasty recipes can serve as a sustainable mean to uplift the nutritional status of masses particularly of the vulnerable ones like school going children and adolescent girls.

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