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Assessment of fortification in ash gourd

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Abstract
In the Kushinagar district, Ash gourd (Benincsahispida) is produced on huge level. Farm women did not know how to prepare and add value in this nutritious vegetable and get benefits in terms of health and income. To enhance their skill and knowledge, Krishi Vigyan Kendra, Kushinagar was organised two training programs, one in KVK Campus, Seorahi block and another in Abhinayakpur village at Kassia block of the district. In both training programs total 53 trainees were participated and they provided the technology with 'Learning by doing' objective. In both training programs, narangiladdoo was prepared from ash gourd. During the training program a pre and post evaluation test was conducted to know the knowledge status of the participants about the technology. After preparation of the product 5 point hedonic scale was used to collect the data regarding sensory analysis of the product. Hedonic scale ranged questions from extremely like to extremely dislike. Regarding getting information about the technology, a self- designed open ended questionnaire with 10 items was prepared and used to collect the data. 94.33% participants said that they never tasted narangiladdoo. Where there 5.66% participants said that have eaten this sweet. 100% participants said that they did not know the processing technique of preparing the narangiladdoo. 66.03% participants said that they do not know which vegetable or fruit has been used to prepare narangiladdoo. 100% participants extremely liked the end product. 62.26% participants said that they will try to make narangiladdoo for consumption. 37.73% participants were not very sure to make this product. 15.09% participants said that they will try to start a business based on this product.100% participants extremely liked overall acceptability of the product. Colour of the product was extremely liked by 92.45% participants. Texture of the product was extremely liked by 83.01% participants and96.22% participants extremely liked the flavour of the product. Aroma of the product was extremely liked by 94.33% participants while 1.88% participants nor liked or nor disliked the aroma of the product. Based on results, it can be concluded that commercial production of the products made by using ash gourd can be promoted as a small scale income generating activity by farm women in Bhadohi district.

Keywords: ash gourd, value addition, doubling the farm women income

Introduction
In Uttar Pradesh, Kushinagar district is well known for Sugar industry. In the Kharif season, ash gourd is a major crop of the city. Farmers export maximum produce of this nutritional vegetable in adjacent states. Besides huge production of the ash gourd, value addition in this vegetable is not so popular in the district. Like other vegetables, ash gourd is not an important part of the kitchen. In rural areas ash gourd is used only in the form of 'badi' which is made with some other ingredients and dried in sunlight. This 'badi' add distinct flavour to the gravy. 'Badi' is found mostly in every kitchen of north India. Ash gourd flesh is used only as sweet delicacy named "Petha" in the different part of the state. Children like this sweet very much. Ash gourd is a rich source of minerals like calcium 30mg, phosphorus 20 mg, iron 0.8 mg, vitamins like niacin 0.0 6 mg, thiamine 0.01 mg and riboflavin 0.4 mg are available / 100 g of fruit as reported by C. Gopalan *et al.* (1971) [1]. Narangiladdoo preparation is a fat and oil free technique so it suits health. Ash gourd has medicinal and therapeutic properties so consumption of this sweet enriches health. In Ayurveda, the functional properties of this vegetable is used in the treatment of ulcer or hypertension. It is also used in the treatment of urinary infections. Ash gourd is used to treat diabetic complications in Korea (Lee *et al.*, 2005) [4]. Ash gourd has anti-mercurial properties, antidote for alcoholic poisoning, is a laxative and diuretic so it cures constipation (CSIR, 1962) [2]. Chinese medical practitioner used ash gourd to treat hypertension and inflammation (Huang *et al*., 2004) [3]. Petha making is a common practice in almost every city of Uttar Pradesh but preparation of narangiladdoo is not so popular. Narangiladdoo is a sweet delicacy and has marvellous taste. Its colour and aroma attracts people. Due to lightness and texture, generally people misunderstands that this sweet is made of papaya.
In rural areas people are not very conscious about add value in unutilized vegetables. Ash gourd is the vegetables which is unexplored for nutritive purpose and value addition. Flesh of ash gourd cannot be eaten as raw. The juice of this vegetable can be used for therapeutic purpose. Doctor's advice must be taken before using ash gourd juice. If farm women add value to this healthy vegetable, they can earn handsome money and double their income. Skill training is must for them to adopt this technology. To popularize the processing technique of narangiladdoo, Krishi Vigyan Kendra organized training program in two blocks of the district. The products made by trainees and they learned every step of processing narangiladdoo. Trainees who attended the program was surprised to know that narangiladdoo is made of ash gourd.

Material and Methods
Raw Material
Mature ash gourd fruit was collected from the local market.

Ash gourd chosen was 10 to 12 kg in weight and free from blemishes, insect bites etc.

Other Material

The orange flavour was introduced to the participants. For this, orange paste, red and yellow colour, orange essence was used to give distinct taste, flavour, aroma and colour.

Method

First, the fruit was washed with fresh water and separated horizontally into two parts. Then it was sliced vertically into 0.50 cm thicknesses, deskinned and seeds were removed. All pieces were soaked in a bucket filled with water. Then all pieces were grated with steel grater. Grated Ash gourd cooked in boiling water for 10-15 minutes to give tenderness. When Ash gourd juliennes became tender then removed from boiling water and cooled. When temperature became normal, 50% sugar was added and mixed well. When sugar dissolved, it was again put on flame to cook. Rest of the sugar was added in intervals. With the help of refractometer, TSS was calculated. When TSS was reached to 68^0C Brix, it was removed from the flame and left to cool down. After that orange paste, red and yellow colour and orange essence were added and mixed well. Participants made narangiladdoo from this material.

Sensory Evaluation

This product was tasted by participants as well as by officials of the KVK, Bhadohi for colour, flavour, aroma, texture and overall acceptability of the product. The tests were performed using 5 point hedonic scale where 5 was extremely liked and 1 was extremely disliked.

Stastical Analysis

Results were analysed for presentation of the data from M S Excel and simple calculation on the basis of data collected from the participants.

Results and Discussions

The chart given below shows the results. 94.33% participants said that they never consumed narangiladoo while 5.66% participants said that they have consumed this sweet. Consumption rate of any food product ensures two things: acceptability of the food product and extension of the technology.

Fig 1: To know the consumption rate of the Narangiladdoo (n=53)

In the chart given below shows the result that participants were asked about processing technique, 100% participants said they did not know the processing technique of narangiladdoo. In rural areas technical know-how is a major factor for adopting any technology.

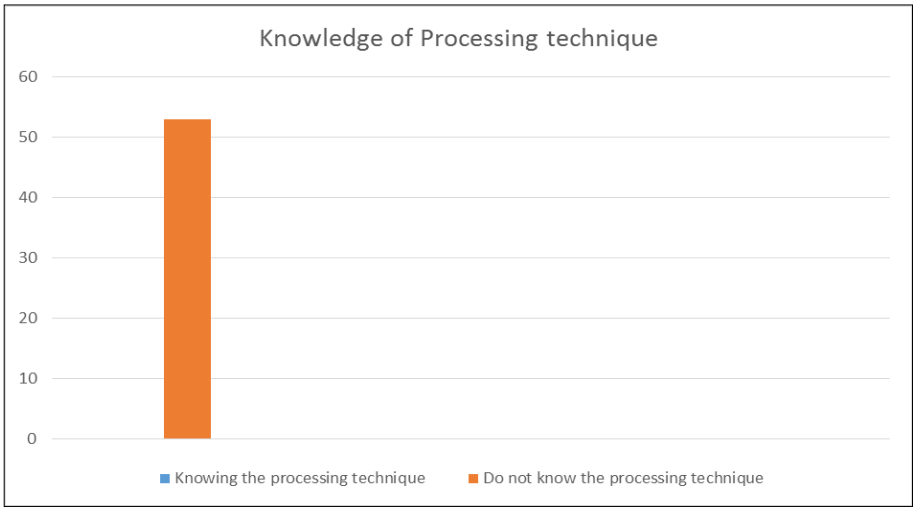

Fig 2: Processing Technique of the Narangiladdoo (n=53)

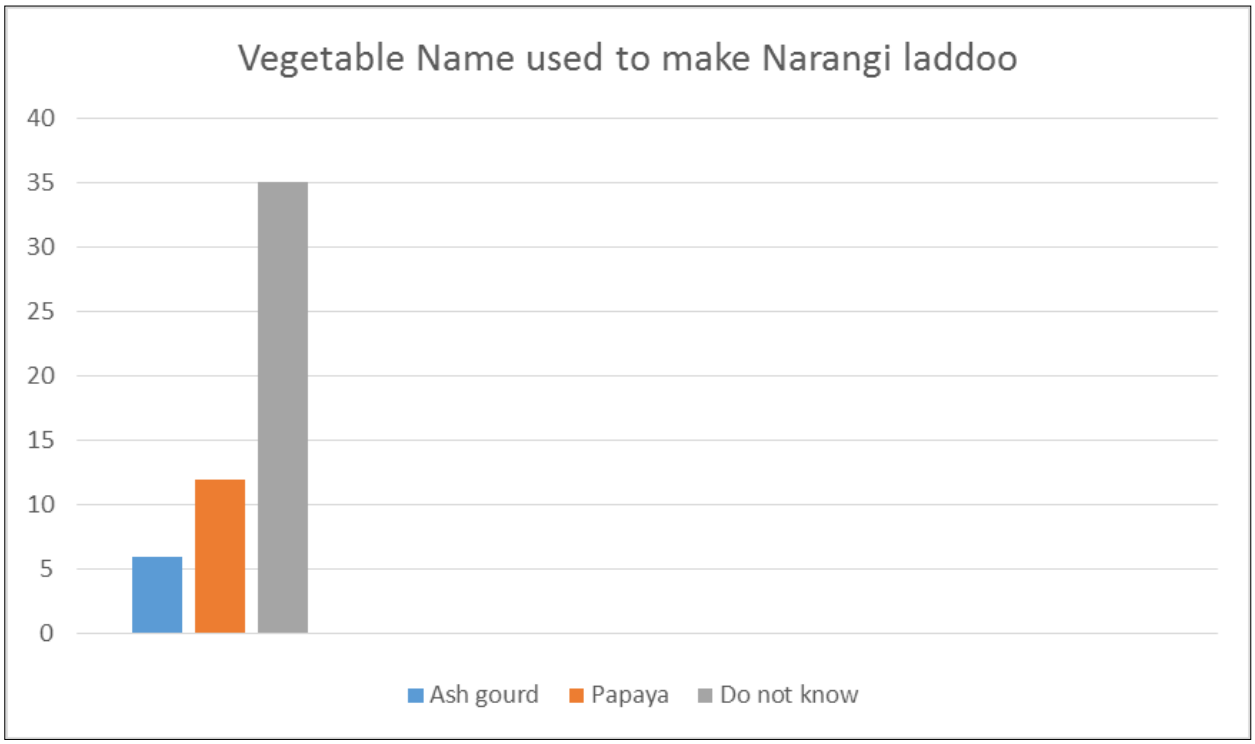

Fig 3: Vegetable used to make narangiladdoo (n=53)

In above chart, participants were asked to name which vegetable or fruit has been used to prepare narangiladdoo. 66.03% participants told that they do not know which vegetable or fruit has been used to prepare narangiladdoo while 22.64% participants said that papaya has been used to make this sweet. Only 11.32% participants knew that ash gourd has been used to make this delicious sweet. It shows that value added products are not easily available in local market to consume. They knew 'Petha' is made from ash gourd. After provided the technology, a post evaluation was done to collect the data regarding acceptance of the technology. In the table given below, 62.26% participants said that they will try to make this product on their own while 37.73% participants felt difficulty to make the product. Only 15.09% participants said that they will try to set up a business based on value added products of ash gourd. They said it is easy to prepare narangiladdoo. Prepared narangiladdoo by trainess.

Table 2: Post evaluation of the technology

No. of Participants	Participants will try	Not Sure	Adopt as business
53	62.26%	37.73%	15.09%

Fig 4

Table 3: Sensory taste evaluation based on hedonic scale (n=53)

Sensory taste on Hedonic scale	Extremely liked	Very good	Nor liked nor disliked	Disliked	Extremely disliked
Overall Acceptability	100%	-	-	-	-
Colour	92.45%	7.54%	-	-	-
Flavour	96.22%	1.88%	-	-	-
Texture	83.01%	11.32%	-	5.66%	-
Aroma	94.33%	3.77%	1.88%	-	-

In the above table, results revealed the sensory taste evaluation based on the hedonic measurement which was collected from trainees. Hedonic measurement was based on overall acceptability, colour, aroma, flavour and texture attributes. Overall acceptability ensures acceptance of the final food product. Acceptability improves confidence in consumer and as well as in manufacturer also. 100% participants extremely liked overall acceptability of the product. Colour is a major measurement for acceptance of any food product. If presented food item has not attractive colour, people hesitate to use it. Colour of the narangiladdoo was extremely liked by 92.45% participants and 7.45% said that colour of the product was very good. It is the flavour attribute of any food product which ensures total acceptability. If flavour is not good then no one wants to consume it. 96.22% participants extremely liked the flavour of the product where there 1.88% participants ranked the product as very good. Texture of the narangiladdoo was very soft in touch. Texture of the product was extremely liked by 83.01% participants and 11.32% participants said that texture was very good. 5.66% participants said they disliked the texture of the product. Aroma of the any product attracts people. Aroma of the product was extremely liked by 94.33% participants and 3.77% participants said aroma of the product was very good. 1.88% participants nor liked or nor disliked the aroma of the product.

Conclusion

Ash gourd has medicinal and therapeutic properties. Rural people are not very aware about medicinal properties of ash gourd. In Bhadohi district ash gourd is produced on huge level. Besides this value addition in this vegetable is not so popular. If value addition in this vegetable can be adopted by farm women they will improve their status and they can double their income. Farm women can be involved in decision making and can be recognized in their respective society. Skill training and knowledge of processing technique in ash gourd is must for setting up a business. Farm women can start a cottage level business based on ash gourd products. At any occasions rather it will be marriage ceremony or any cultural program, sweets made from ash gourd are always in demand specifically in summer season. Results collected from training participants shows that technical and skill gap is a major hurdle in improving farm women status. Quality assures acceptability and demand. Locally produced vegetables are easily available and farm women should adopt value addition technologies in these vegetables to improve their financial status. These practices are better choices for betterment of farm women. Other products made from this vegetable are not as popular as 'Petha'. It's marvellous taste and colour attracts everyone. During these training programs narangiladdoo was kept at room temperature for measuring storage period of the product. Narangiladdoo can be kept at room temperature for 3-4 days. If it is fridged, it can be stored for one week. So, there is a need to popularize delicacies made from ash gourd.

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