



## Awareness on consumption as well as cultivation of some iron rich leafy vegetables under foot hills of West Bengal : A descriptive study

\*K. DAS, <sup>1</sup>B. MAITY, R. CHATTERJEE, <sup>1</sup>K. PRADHAN, AND <sup>1</sup>P. K. PAUL

Department of Vegetable and Spice Crops, <sup>1</sup>Department of Agricultural Extension  
Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal, 736165.

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### ABSTRACT

An exploratory study was conducted during January 2019 to February 2020 in five different villages of Cooch Behar district of West Bengal on the basis of semi-structured interview schedule to assess the level of awareness of the rural people about consumption of iron rich leafy vegetables to mitigate the problem of iron deficiency anaemia which is reported to be a worldwide health problem. In totality sixty numbers of randomly selected respondents from five villages were considered for primary data collection. 53 respondents (88.33 %) were reported to acquire medium level of knowledge whereas higher level of knowledge about consumption of different iron rich leafy vegetables was totally absent among the respondents which might be attributed to scarce of scientific nutrition education. In the correlation analysis the awareness level of the respondents is positively and significantly associated with the scientific education of the respondents. Therefore, enhancement of awareness level and scientific education of the rural respondents through different awareness building programmes might be a suitable alternative to alleviate occurrence of iron scarcity imparted anaemia.

**Keywords:** Awareness, deficiency, iron, leafy vegetables, nutritional security

Leafy vegetables play a key role in balanced human nutrition. They are wealth of carotene (provitamin A), riboflavin (vitamin B<sub>2</sub>), ascorbic acid (vitamin C) and minerals like iron, calcium and phosphorous (Dhaliwal, 2017; Thamburaj and Singh, 2001). Green leafy vegetables are provided in daily diet from ancient times as it is a storehouse of different nutrients, minerals and phytochemicals essential for human health. The nutritional aspects of human health of the worldwide increasing populations are being major challenges especially in developing countries. In one hand leafy vegetables act as sources of energy, micronutrients and essential nutrients, on the other hand these also provide different phyto-chemicals that regulate some physiological activities like glycemic control, immunostimulation or antioxidant activity offering further resistance on human bodies (Belanger *et al.*, 2004). It is estimated that 100g of tropical leafy vegetables can supply 60-140 mg of vitamin C, 100 micro gram of folic acid, 4-7 mg iron and 200-400 mg of calcium (Thamburaj and Singh, 2001). Micronutrient deficiency referring iron, iodine and vitamin A is a foremost health problem in our country. As per report of Food and Agriculture Organization on the state of food security and nutrition, it was assured that 190.7 million (14.5 percent) people in India were malnourished during 2014 to 2016 (FAO, 2017). In India, during 2016 around 0.5 per cent of total deaths were owing to nutritional deficiencies (India State-Level Disease Burden Initiative Collaborators, 2017). Micronutrient deficiencies mainly

occur as because of improper knowledge regarding consumption of micronutrient rich foods and proper diet index coupled with poor intake of vitamin A from animal sources and its precursor ( $\beta$ -carotene) from plants especially leafy vegetables as a result of low socio-economic status and standard of living. Malnutrition from micronutrient deficiency mainly include iron deficiency anaemia, calcium deficiency and vitamin A deficiency that mostly prevalent in India as well as other developing countries resulting in lot of consequences. Iron that mostly is accessible from our diet through different vegetables, especially the leafy vegetables, is one of the most important micronutrients compulsory for survival of human beings as its essentiality to synthesise globin-proteins particularly haemoglobin and myoglobin that are involved in oxygen transport in blood and to produce heme enzymes and other iron-containing enzymes that actively participate in electron transfer and oxidation reduction reactions (Hurrell, 1997 ; Abbaspour *et al.*, 2014). In relation to this phenomenon, a severe health problem, anaemia as a result of iron deficiency became highly violent throughout the world especially among the women and children. Statistical survey revealed that more than 2 billion people globally are suffering from this iron deficiency induced anaemia (Yang *et al.*, 2007). Besides iron deficiency and other micronutrient deficiency like calcium deficiency and vitamin A deficiency were also found to be the most serious effects among the rural people especially the women all over the world (Alam *et al.*, 2010). The rural

people especially the women become malnourished because of insufficient knowledge regarding nutrition due to lack of education leading to nutritional deficiencies that result in several health hazards, illness and household food insecurity. (Mariammal *et al.*, 2019) The diet of rural family is predominantly based on rice providing carbohydrates only, without emphasising on consumption of protective foods like vegetables, more specifically leafy vegetables that serve as a source of vitamins and minerals contributing high profile resistance to the body. Therefore, modification of consumption pattern of rural people through incorporation of more amount of vegetables, leafy vegetables is utmost important to reduce the micronutrient deficiency symptoms and such related health problems, illness or diseases (Mariammal *et al.*, 2019). Considering that consequences, to upgrade the knowledge level towards nutritional and medicinal values of different leafy vegetables and proficiency of their scientific cultivation practices might be a suitable approach to change the traditional consumption pattern of the rural people.

Hence, the present exploratory study was carried out to evaluate the present consumption pattern of leafy vegetables among the rural people and to assess the awareness in terms of consumption of leafy vegetables considering their nutritional and medicinal values and also their scientific cultivation practices. The consumption pattern is of much importance to uplift the status of the nutritionally deficient people in the villages of the country to ensure the food and nutritional security in near future.

## **MATERIALS AND METHODS**

The study was conducted during January 2019 to February 2020 in five different villages, namely Singimari, Khagribari, Gopalpur, Chandamari and Patpishu at the Coochbehar-II block of Cooch Behar district in West Bengal, on the lap of foothills of Eastern Himalayas also known as *Terai* zone. The multistage purposive and random sampling procedures on the basis of knowledge of the rural people towards awareness of consumption of iron rich leafy vegetables were followed to select the district, block, villages and the respondents of the present study. The rationale behind selection of this sampling for the selection of District, is hotspot of biodiversity with presence of more than forty leafy vegetables (Maitra and Chatterjee, 2014) and the inhabitants of the areas preferably depend on agriculture and traditional knowledge on medicinal values of different herbs including leafy vegetables for their financial assistance through selling those in the market and treating the ailments at the village level to sustain their livelihood and health system.

The data were collected with the help of semi structured interview schedule through personal interview method to generate important information related to the present study. The interview schedule was prepared on the basis of different two points scale and five points scale based statements describing knowledge and awareness of the rural people towards consumption of several iron rich leafy vegetables. Different knowledge assessing parameters were knowledge of the rural people about different non-traditional leafy vegetables, some leaves of tree used as leafy vegetables, nutritional values of different leafy vegetables, different iron rich leafy vegetables, different medicinal values of leafy vegetables, medicinal values of some edible non-traditional wild leafy vegetables, cultivation practices of different leafy vegetables and also the attitude of the rural people regarding awareness and cultivation of iron rich leafy vegetables. All the parameters were based on two points scale except the parameter determining the attitude of the rural people regarding awareness and cultivation of iron rich leafy vegetables which was based on five point scale. Two point scale based statements were prepared only by asking information about the definite parameter where they know or do not know. If they know, then the respondent secured one score otherwise scored zero. Accordingly schedule for all the two point scale parameters for the respondent were prepared. In case of five point scale based parameter, i.e., attitude of the rural people regarding awareness and cultivation of iron rich leafy vegetables, twenty several statements based on their knowledge about cultivation of different leafy vegetables, eagerness of the people to know more new information or modern technology about its cultivation, whether major crop i.e., rice, wheat or any other agronomic cash crop cultivation may be substituted by leafy vegetables' cultivation, whether handsome return within very short period of time utilizing very little input may be beneficial or cultivation of leafy vegetables may be more preferable compared to any other unstable jobs etc. were asked to each respondent. Considering their responses according to the level of acceptance of the statements scoring from one to five was done. After completion of scoring of each parameter for each respondent total score was counted and in this way scoring for all the parameters were counted and every schedule was prepared and accordingly schedule of all the respondents were fulfilled successfully and results were tabulated. Twelve respondents from each of the five villages were selected, making a total of sixty respondents as the sample for primary data collection under the present study. The data were analyzed by using statistical tools like frequency, percentage, mean values, standard deviation and coefficient of variation.

## RESULTS AND DISCUSSION

### *Age of the participating rural population*

The data recorded on age of all the respondents are presented in Table 1 which indicates that the respondents are categorised into three age groups *i.e.*, less than 26 years of lower age group, between 26 to 38 years of medium age group and more than 38 years of higher age group. Among the total sixty respondents eight people contributing 13.33 per cent, forty seven people contributing 78.33 per cent and five people contributing 8.33 per cent were found to be classified under lower age group, medium age group and higher age group respectively.

### *Education of the respondents*

The results of the present study (Table 2) reveals that only two people contributing 3.33 % were found to acquire very less education, forty six people contributing 76.67 % were found to obtain medium level of education *i.e.*, higher secondary qualification and twelve respondents contributing 20.00% of the total responding people were found to attain higher level of education *i.e.*, graduation.

### *Consumption pattern of different iron-rich leafy vegetables of the respondents and availability of these around their locality*

The consumption pattern of different iron rich leafy vegetables of the rural respondents and source of availability of these around their surroundings have been presented in Table 3, 4 and 5. It is evident from the tables that nobody was found to intake any leafy vegetables on a daily basis, it was also found that all the respondents do not consume all the enlisted leafy vegetables except some very common leafy vegetables that include leaves of *Chenopodium album*, *Amaranthus tricolor*, *Diplazium esculentum*, *Coriandrum sativum*, *Colocasia esculenta*, *Ipomoea reptans*, *Raphanus sativus* and *Beta vulgaris* var. *bengalensis* and the highest percentage regarding non consumption of leafy vegetables was recorded for leaves of *Enhydra fluctuans* (66.67% people) followed by *Trichosanthes dioica* (51.67% people) and the lowest percentage was obtained from 3.33% people for not consuming both *Cucurbita moschata* and *Lagenaria vulgaris* leaves. Maximum number of people was found to consume of *Coriandrum sativum* leaves (28 people) followed by *Beta vulgaris* var. *bengalensis* (24 people) and *Chenopodium album* (22 people) on a count of once in a week basis whereas, the highest frequency of the respondents on a count of once in a month basis was reported from *Brassica rapa* (38 people) leaves followed by *Moringa oleifera* (35 people) leaves and *Beta vulgaris* var. *bengalensis* (34 people) leaves. Considering the seasonal pattern of

consuming different leafy vegetables, the highest percentage frequency of the participants (76.67 % people) was found for intake of *Alocasia indica* leaves followed by *Paederia foetida* (68.33% people) leaves and *Cicer arietinum* (66.67% people) leaves respectively. The statistics of consumption pattern of different leafy vegetables of the rural community was also assigned that 0.19 per cent (4 people), 12.24 percent (257 people), 31.90 per cent (670 people) and 41.86 per cent (879 people) of them consume different leafy vegetables on daily basis, once in a week, once in a month and seasonal basis respectively.

With respect to data obtained in terms of resource of availability of different leafy vegetables that the village people consume, clearly revealed that some of the leafy vegetables were cultivated, some of them were collected from local resource and some were purchased by the respondents. Considering available source as cultivation it was shown that maximum number of people was found to consume *Amaranthus tricolor* (55 people) leaves by cultivation in their own field followed by leaves of *Corchorus capsularis* (54 people) and *Beta vulgaris* var. *bengalensis* (50 people) while, minimum number of people was found to intake *Typhonium trilobatum* and *Azadirachta indica* leaves (5 people for each) through cultivation and only three leafy vegetables namely *Oxalis corniculata*, *Chenopodium album* and *Diplazium esculentum* leaves were reported to not be cultivated any time in their own field at all. Highest number of participants were provided their response to eat leaves of *Chenopodium album* (56 people) followed by *Diplazium esculentum* (56 people), *Centella asiatica* (43 people) leaves and lowest result was obtained from *Corchorus capsularis* and *Amaranthus tricolor* (3 people each) leaves regarding availability of different leafy vegetables through collection from local resource. The highest frequency for consumption by purchasing it from market was recorded in *Brassica rapa* (16 people) leaves followed by *Alocasia indica* leaves (13 people) and result for least purchasing was obtained from leaves of *Trigonella foenum graecum* and *Moringa oleifera* (1 person for each). The overall statistics revealed that 41.33 % respondents were involved in cultivation, 34.29 % for collection from local resource and 5.57 % of them were concerned for purchasing different leafy vegetables to fulfil their demand for consumption.

### *Knowledge of the respondents about different non-traditional leafy vegetables and some tree leaves used as leafy vegetables*

The statistics of (Table 6) the experimental study in accordance with the previously formed interview schedule suggested that among all the respondents 15.00

**Table 1: Descriptive distribution of the respondents according to their age**

Age category	Age group	Frequency	Percentage	Statistics
<b>Low</b>	Less than 26	8	13.33 %	MEAN = 32.38
<b>Medium</b>	26-38	47	78.33 %	SD = 6.03
<b>High</b>	More than 38	5	8.33 %	C.V. = 18.61 %

**Table 2: Descriptive distribution of the respondents according to their education**

Education category	Education group	Frequency	Percentage	Statistics
<b>Low</b>	Less than 8	2	3.33 %	Mean = 10.32
<b>Medium</b>	8-13	46	76.67 %	SD = 2.75
<b>High</b>	More than 13	12	20.00%	C.V. = 26.67 %

**Table 3: Percentage of consumption pattern of different iron rich leafy vegetables of the rural people**

Sl. No.	Vernacular Name	Botanical name	Daily	Once in a week	Once in a month	Seasonal	Never
1	Alusak	<i>Solanum tuberosum</i>	0	11.67	20.00	35.00	33.33
2	Amrul	<i>Oxalis corniculata</i>	0	0.00	10.00	41.67	48.33
3	Bathua	<i>Chenopodium album</i>	0	36.67	51.67	11.67	0.00
4	Brahmisak	<i>Bacopa monnieri</i>	0	6.67	30.00	53.33	10.00
5	Cholasak	<i>Cicer arietinum</i>	0	6.67	18.33	66.67	8.33
6	Data sak	<i>Amaranthus tricolor</i>	0	21.67	55.00	23.33	0.00
7	Dhemchi	<i>Fagopyrum esculentum</i>	0	16.67	40.00	35.00	8.33
8	Dhenki	<i>Diplazium esculentum</i>	0	10.00	30.00	60.00	0.00
9	Dhone pata	<i>Coriandrum sativum</i>	0	46.67	43.33	10.00	0.00
10	Gandal pata	<i>Paederia foetida</i>	0	3.33	18.33	68.33	10.00
11	Gima sak	<i>Glinus oppositifolius</i>	0	0.00	10.00	55.00	35.00
12	Helencha sak	<i>Enhydra fluctuans</i>	0	0.00	8.33	25.00	66.67
13	Kachu sak	<i>Colocasia esculenta</i>	0	13.33	36.67	50.00	0.00
14	Kalmi	<i>Ipomoea reptans</i>	0	18.33	40.00	41.67	0.00
15	Kharkon	<i>Typhonium trilobatum</i>	0	5.00	23.33	55.00	16.67
16	Khesari	<i>Lathyrus sativus</i>	0	6.67	20.00	51.67	21.67
17	Kulekhara	<i>Asteracantha longifolia</i>	0	0.00	15.00	63.33	21.67
18	Kumrosak	<i>Cucurbita moschata</i>	0	20.00	35.00	41.67	3.33
19	Lafasak	<i>Malva verticillata</i>	0	11.67	43.33	40.00	5.00
20	Lal sak	<i>Amaranthus tricolor</i>	0	21.67	48.33	30.00	0.00
21	Lau sak	<i>Lagenaria vulgaris</i>	0	10.00	36.67	50.00	3.33
22	Maan	<i>Alocasia indica</i>	0	0.00	6.67	76.67	16.67
23	Matar sak	<i>Pisum sativum</i>	0	6.67	23.33	50.00	20.00
24	Methi sak	<i>Trigonella foenumgraecum</i>	0	10.00	18.33	66.67	5.00
25	Mula sak	<i>Raphanus sativus</i>	0	21.67	46.67	31.67	0.00
26	Neem pata	<i>Azadirachta indica</i>	0	0.00	18.33	48.33	33.33
27	Palak	<i>Beta vulgaris</i> var. <i>bengalensis</i>	0	40.00	56.67	3.33	0.00
28	Patal pata	<i>Trichosanthes dioica</i>	0	0.00	6.67	41.67	51.67
29	Pat sak	<i>Corchorus capsularis</i>	0	18.33	41.67	35.00	5.00
30	Peyaj sak	<i>Allium cepa</i>	0	8.33	36.67	48.33	6.67
31	Rai sak	<i>Brassica rapa</i>	0	18.33	63.33	13.33	5.00
32	Sada poi/Lal poi	<i>Basella alba</i> / <i>B. rubra</i>	0	23.33	48.33	23.33	5.00
33	Pudina	<i>Mentha arvensis</i> var. <i>piperescence</i>	0	0.00	26.67	46.67	26.67
34	Sajina-sak	<i>Moringa oleifera</i>	0	5.00	58.33	30.00	6.67
35	Thankuni	<i>Centella asiatica</i>	6.67	10.00	31.67	41.67	10.00



**Table 4: Overall consumption pattern of different iron rich leafy vegetables of the farmers and rural people**

Frequency and percentage	Daily	Once in a week	Once in a month	Seasonal
Total frequency	4	257	670	879
Mean frequency	0.11	7.34	19.14	25.11
Percentage	0.19 %	12.24 %	31.90 %	41.86 %

**Table 5: Source of availability of different iron rich leafy vegetables of the farmers and rural people**

Sl. No.	Vernacular Name	Botanical name	Cultivation	Collection from wild source	Purchase
1	Alu sak	<i>Solanum tuberosum</i>	32	8	0
2	Amrul	<i>Oxalis corniculata</i>	0	31	0
3	Bathua	<i>Chenopodium album</i>	0	56	4
4	Brahmi sak	<i>Bacopa monnieri</i>	11	40	3
5	Chola sak	<i>Cicer arietinum</i>	46	9	0
6	Data sak	<i>Amaranthus tricolor</i>	55	3	2
7	Dhemchi	<i>Fagopyrum esculentum</i>	47	6	2
8	Dhenki	<i>Diplazium esculentum</i>	0	55	5
9	Dhonepata	<i>Coriandrum sativum</i>	45	12	3
10	Gandal pata	<i>Paederia foetida</i>	12	42	0
11	Gimasak	<i>Glinus oppositifolius</i>	15	24	0
12	Helencha sak	<i>Enhydrafluctuans</i>	12	4	4
13	Kachu sak	<i>Colocasia esculenta</i>	21	34	5
14	Kalmi	<i>Ipomoea reptans</i>	35	20	5
15	Kharkon	<i>Typhonium trilobatum</i>	5	41	4
16	Khesari	<i>Lathyrus sativus</i>	32	8	7
17	Kulekhara	<i>Asteracantha longifolia</i>	22	16	9
18	Kumro sak	<i>Cucurbita moschata</i>	45	13	0
19	Lafa sak	<i>Malva verticillata</i>	35	18	4
20	Lal sak	<i>Amaranthus tricolor</i>	41	11	8
21	Lau sak	<i>Lagenaria vulgaris</i>	45	10	3
22	Maan	<i>Alocasia indica</i>	15	22	13
23	Matar sak	<i>Pisum sativum</i>	38	10	0
24	Methi sak	<i>Trigonella foenum graecum</i>	35	21	1
25	Mula sak	<i>Raphanus sativus</i>	40	16	4
26	Neem pata	<i>Azadirachta indica</i>	5	35	0
27	Palak	<i>Beta vulgaris var. bengalensis</i>	50	8	2
28	Patal pata	<i>Trichosanthes dioica</i>	20	9	0
29	Pat sak	<i>Corchorus capsularis</i>	54	3	0
30	Peyaj sak	<i>Allium cepa</i>	43	10	3
31	Rai sak	<i>Brassica rapa</i>	16	25	16
32	Sada poi/Lal poi	<i>Basella alba / B. rubra</i>	42	12	3
33	Pudina	<i>Mentha arvensis var. piperescence</i>	23	15	6
34	Sajina sak	<i>Moringa oleifera</i>	25	30	1
35	Thankuni	<i>Centella asiatica</i>	11	43	0
	Total frequency	<b>973.00</b>	<b>720.00</b>	<b>117.00</b>	
	Mean	<b>27.80</b>	<b>20.57</b>	<b>3.34</b>	
	Percentage	<b>41.33 %</b>	<b>34.29 %</b>	<b>5.57 %</b>	

**Table 6: Distribution of the respondents according to their knowledge about different non-traditional leafy vegetables, tree leaves used as leafy vegetables, nutritional benefits of different leafy vegetables, different iron rich leafy vegetables, medicinal values of different iron rich leafy vegetables, medicinal values of some non-traditional leafy vegetables, cultivation practices of leafy vegetables**

Knowledge category	Knowledge group	Frequency	Percentage	Statistics
Low	Less than 8	9	15.00 %	Mean = 8.40
Medium	8-9	43	71.67 %	SD = 1.06
High	More than 9	8	13.33 %	C.V.= 12.62 %
Knowledge category	Knowledge group	Frequency	Percentage	Statistics
Low	Less than 1	0	0.00 %	Mean=1.65
Medium	1-2	60	100.00 %	SD=0.48
High	More than 2	0	0.00 %	C.V. = 29.09 %
Knowledge category	Knowledge group	Frequency	Percentage	Statistics
Medium	Less than 9	7	11.67 %	Mean=9.67
High	9-11	53	88.33 %	SD=0.95
High	More than 11	0	0.00 %	C.V. = 9.82 %
Knowledge category	Knowledge group	Frequency	Percentage	Statistics
Low	Less than 9	7	11.67 %	Mean= 9.83
Medium	9-11	53	88.33 %	SD=1.12
High	More than 11	0	0.00 %	C.V. = 9.82 %
Knowledge category	Knowledge group	Frequency	Percentage	Statistics
Low	Less than 11	3	5.00 %	Mean= 12.88
Medium	11-14	51	85.00%	SD =1.44
High	More than 14	6	10.00 %	C.V. = 11.18 %
Knowledge category	Knowledge group	Frequency	Percentage	Statistics
Low	Less than 5	3	5.00 %	Mean= 5.95
Medium	5-7	57	95.00%	SD= 0.81
High	More than 7	0	0.00 %	C.V. = 13.61 %
Knowledge category	Knowledge group	Frequency	Percentage	Statistics
Low	Less than 9	4	6.67 %	Mean= 9.95
Medium	9-11	53	88.33%	SD= 1.02
High	More than 11	3	5.00 %	C.V. = 10.25 %
Knowledge category	Knowledgegroup	Frequency	Percentage	Statistics
Low	Less than 62	8	13.33 %	Mean= 65.40
Medium	62-69	43	71.67%	SD= 3.58
High	More than 69	9	15.00 %	C.V. = 5.47 %

per cent people had lower knowledge, 71.67 per cent people had medium knowledge and 13.33 per cent people had comparatively higher knowledge regarding different non-traditional leafy vegetables like leaves of *Solanum tuberosum* (Potato), *Bacopa monnieri* (Bramhi), *Cicer arietinum* (Chickpea), *Typhonium trilobatum* (Kharkon), *Lathyrus sativus* (Khesari), *Boerhaavia diffusa* (Punarnaba) , *Moringa oleifera*

(*Moringa*), *Alternanthera sessilis* (Salinche), *Nymphaea alba* (Sapla) etc. which were not commonly cultivated commercially for consumption as leafy vegetables, whereas all the respondents (100%) had medium knowledge (Table 6) regarding consumption of tree leaves as leafy vegetables like *Azadirachta indica* (Neem) and *Moringa oleifera* (Moringa).

**Table 7: Correlation matrix on different knowledge parameters of the respondents regarding awareness on consumption of iron rich leafy vegetables**

	AGE	EDU	KNTLV	KTLV	KNBLV	KIRLV	KMVLV	KMVNTLV	KCPLV	AOCCLV
AGE	1.00									
EDU	0.007 <sup>NS</sup>	1.00 <sup>NS</sup>								
KNTLV	0.018 <sup>NS</sup>	0.333 <sup>**</sup>	1.00							
KTLV	0.088 <sup>NS</sup>	0.149 <sup>NS</sup>	0.246 <sup>NS</sup>	1.00						
KNBLV	-0.069 <sup>NS</sup>	0.035 <sup>NS</sup>	0.571 <sup>**</sup>	0.074 <sup>NS</sup>	1.00					
KIRLV	0.197 <sup>NS</sup>	0.193 <sup>NS</sup>	0.641 <sup>**</sup>	0.267 <sup>*</sup>	0.551 <sup>**</sup>	1.00				
KMVLV	-0.012 <sup>NS</sup>	0.108 <sup>NS</sup>	0.653 <sup>**</sup>	0.234 <sup>NS</sup>	0.566 <sup>**</sup>	0.638 <sup>**</sup>	1.00			
KMVNTLV	0.101 <sup>NS</sup>	0.053 <sup>NS</sup>	0.437 <sup>**</sup>	0.172 <sup>NS</sup>	0.308 <sup>**</sup>	0.307 <sup>*</sup>	0.459 <sup>**</sup>	1.00		
KCPLV	0.031 <sup>NS</sup>	0.291 <sup>*</sup>	0.538 <sup>**</sup>	0.137 <sup>NS</sup>	0.351 <sup>**</sup>	0.275 <sup>*</sup>	0.402 <sup>**</sup>	0.429 <sup>**</sup>	1.00	
AOCCLV	-0.050 <sup>NS</sup>	0.640 <sup>**</sup>	0.497 <sup>**</sup>	0.171 <sup>NS</sup>	0.458 <sup>**</sup>	0.477 <sup>**</sup>	0.457 <sup>**</sup>	0.089 <sup>NS</sup>	0.406 <sup>**</sup>	1.00

NS - Non significant, \*\* - Highly significant at 1% level, \* - Significant at 5 % level

Edu – Education, KNTLV – Knowledge on non-traditional leafy vegetables, KTLV - Knowledge on tree leaves used as leafy vegetables, KNBLV - Knowledge on nutritional benefits of different leafy vegetables, KIRLV - Knowledge on iron rich leafy vegetables, KMVLV- Knowledge on different medicinal values of leafy vegetables, KMVNTLV - Knowledge on medicinal values of some non-traditional leafy vegetables, KCPLV - Knowledge on cultivation practices of different iron rich leafy vegetables, AOCCLV - Attitude of the respondents about awareness and cultivation of iron rich leafy vegetables.

#### **Knowledge of the respondents about nutritional benefits of different leafy vegetables and different iron rich leafy vegetables**

The data obtained in terms of nutritional benefits of different leafy vegetables (Table 6) and awareness about different iron rich leafy vegetables (Table 6) presented that 11.67 per cent respondents were found to acquire comparatively lower knowledge and 88.33 per cent respondents were found to have medium knowledge and no respondent were found to acquire higher knowledge which might be due to less scientific education regarding nutritional benefits of leafy vegetables and awareness towards iron nutrition.

#### **Knowledge of the respondents about medicinal values of different iron rich leafy vegetables and medicinal values of some non-traditional leafy vegetables**

The results of the investigation presented in table 6 revealed that 5.00 per cent of the respondents were found to acquire low level of knowledge, 85.00 per cent of the respondents were found to have medium knowledge and remaining 10.00 per cent of the respondents were found to acquire higher knowledge about medicinal values of different iron rich leafy vegetables, whereas 5.00 per cent of the rural people exposed their less knowledge, rest 95.00 per cent people were found to have medium level of knowledge and nobody was reported to acquire high quality knowledge about medicinal values of some non-traditional leafy vegetables.

#### **Knowledge of the respondents about cultivation practices of leafy vegetables**

The data recorded (Table 6) about knowledge of the rural community on cultivation practices of different

leafy vegetables clearly demonstrated that only four people contributing 6.67 per cent, fifty three people contributing 88.33 per cent and rest three people contributing 5.00 per cent of the total participated rural people acquired less, medium and higher level of knowledge respectively.

#### **Knowledge of the respondents about awareness and cultivation of iron rich leafy vegetables**

The statistics of (Table 6) the experimental study in accordance with the semi structured interview schedule indicated that 13.33 per cent of the respondents were expressed lesser knowledge, 71.67 per cent of the respondents expressed medium knowledge and 15.00 per cent of the participants expressed higher level of knowledge about both awareness for consumption and cultivation of iron rich leafy vegetables.

#### **Relational analysis**

The statistical analysis of correlation among all the parameters represented in Table 7 revealed that the level of education of the respondents was found to have highly significant positive correlation with their knowledge about non-traditional leafy vegetables (0.333<sup>\*\*</sup>), knowledge on awareness and cultivation aspects of iron rich leafy vegetables (0.640<sup>\*\*</sup>) and a positive significant correlation with education level was also found for knowledge on cultivation practices of different iron rich leafy vegetables (0.291<sup>\*</sup>). Knowledge on non-traditional leafy vegetables of the participants was positively correlated in highly significant fashion with their knowledge on nutritional benefits of different leafy vegetables (0.571<sup>\*\*</sup>), iron rich leafy vegetables (0.641<sup>\*\*</sup>), different medicinal values of leafy vegetables (0.653<sup>\*\*</sup>), some other non-traditional leafy vegetables (0.437<sup>\*\*</sup>),

cultivation practices of different iron rich leafy vegetables (0.538\*\*) and attitude on awareness and cultivation of iron rich leafy vegetables (0.497\*\*). Knowledge of the participants about tree leaves used as leafy vegetables was significantly (0.267\*) correlated with their Knowledge on iron rich leafy vegetables. Knowledge of the respondents on nutritional benefits of different leafy vegetables had also highly significant correlation with knowledge on iron rich leafy vegetables (0.551\*\*), different medicinal values of leafy vegetables (0.566) and some other non-traditional leafy vegetables (0.308\*\*), cultivation practices of different iron rich leafy vegetables (0.351\*\*) and their knowledge on awareness and cultivation of iron rich leafy vegetables (0.458\*\*). Their knowledge on iron rich leafy vegetables was found to be positively correlated with their knowledge on different medicinal values of leafy vegetables (0.638\*\*), medicinal values of some non-traditional leafy vegetables (0.307\*), cultivation practices of different iron rich leafy vegetables (0.275\*) and also regarding their attitude about awareness and cultivation of iron rich leafy vegetables (0.477\*\*). Knowledge of the rural community on medicinal values of different leafy vegetables was established highly significant correlation with their knowledge on medicinal values of some non-traditional leafy vegetables (0.459\*\*), cultivation practices of different iron rich leafy vegetables (0.402\*\*) and attitude of the respondents about awareness and cultivation aspects of iron rich leafy vegetables (0.457\*\*). Knowledge of the respondents on medicinal values of some non-traditional leafy vegetables was found to be positively correlated with their knowledge on cultivation practices of different iron rich leafy vegetables in a highly significant manner (0.429\*\*) and their knowledge on cultivation practices of different iron rich leafy vegetables was also established a strong positive correlation (0.406\*\*) with their attitude towards awareness and cultivation of iron rich leafy vegetables.

In recent time, one of the main global challenges is how to ensure nutritional security for a growing population while accommodating for increasing extremities of disasters, including those caused by climate change, increased economic volatility and ensuring long-term sustainable development. According to recently available information bank the fourteen per cent of the global population is under nourished till date amongst which around 49% is children and 51% is women. So, under such a situation the awareness evaluation and studying the consumption pattern of iron rich leafy vegetables is a very great concern of the present study. The study reflected that the selected 35 number of iron rich leafy vegetables are very important in the diet of the local people to ensure the nutritional security at the foothill region of West Bengal. The availability and accessibility of these selected vegetables in this zone are very helpful to meet the need of the

local people. The awareness and knowledge of the local people regarding the consumption pattern, cultivation practices are not praiseworthy. The knowledge on awareness related to the same is also at the lower side. So, in such a situation the need of the hour is to develop a concrete strategy for enhancement of knowledge and awareness in terms of consumption, utilization and cultivation of iron rich leafy vegetables in the foot hills of West Bengal through demonstration, training, campaigning and other extension methods.

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