

Print ISSN : 0972-8813
e-ISSN : 2582-2780

[Vol. 21(3) September-December 2023]

Pantnagar Journal of Research

(Formerly International Journal of Basic and
Applied Agricultural Research ISSN : 2349-8765)



G.B. Pant University of Agriculture & Technology, Pantnagar



ADVISORYBOARD

Patron

Dr. Manmohan Singh Chauhan, Vice-Chancellor, G.B. Pant University of Agriculture and Technology, Pantnagar, India

Members

Dr. A.S. Nain, Ph.D., Director Research, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Jitendra Kwatra, Ph.D., Director, Extension Education, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. S.K. Kashyap, Ph.D., Dean, College of Agriculture, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. S.P. Singh, Ph.D., Dean, College of Veterinary & Animal Sciences, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. K.P. Raverkar, Ph.D., Dean, College of Post Graduate Studies, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Sandeep Arora, Ph.D., Dean, College of Basic Sciences & Humanities, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Alknanda Ashok, Ph.D., Dean, College of Technology, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Alka Goel, Ph.D., Dean, College of Community Science, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Malobica Das Trakroo, Ph.D., Dean, College of Fisheries, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. R.S. Jadoun, Ph.D., Dean, College of Agribusiness Management, G.B. Pant University of Agri. & Tech., Pantnagar, India

EDITORIALBOARD

Members

Prof. A.K. Misra, Ph.D., Chairman, Agricultural Scientists Recruitment Board, Krishi Anusandhan Bhavan I, New Delhi, India
Dr. Anand Shukla, Director, Reefberry Foodex Pvt. Ltd., Veraval, Gujarat, India
Dr. Anil Kumar, Ph.D., Director, Education, Rani Lakshmi Bai Central Agricultural University, Jhansi, India
Dr. Ashok K. Mishra, Ph.D., Kemper and Ethel Marley Foundation Chair, W P Carey Business School, Arizona State University, U.S.A
Dr. B.B. Singh, Ph.D., Visiting Professor and Senior Fellow, Dept. of Soil and Crop Sciences and Borlaug Institute for International Agriculture, Texas A&M University, U.S.A.
Prof. Binod Kumar Kanaujia, Ph.D., Professor, School of Computational and Integrative Sciences, Jawahar Lal Nehru University, New Delhi, India
Dr. D. Ratna Kumari, Ph.D., Associate Dean, College of Community / Home Science, PJTSAU, Hyderabad, India
Dr. Deepak Pant, Ph.D., Separation and Conversion Technology, Flemish Institute for Technological Research (VITO), Belgium
Dr. Desirazu N. Rao, Ph.D., Professor, Department of Biochemistry, Indian Institute of Science, Bangalore, India
Dr. G.K. Garg, Ph.D., Dean (Retired), College of Basic Sciences & Humanities, G.B. Pant University of Agric. & Tech., Pantnagar, India
Dr. Humnath Bhandari, Ph.D., IIRRI Representative for Bangladesh, Agricultural Economist, Agrifood Policy Platform, Philippines
Dr. Indu S Sawant, Ph.D., Director, ICAR - National Research Centre for Grapes, Pune, India
Dr. Kuldeep Singh, Ph.D., Director, ICAR - National Bureau of Plant Genetic Resources, New Delhi, India
Dr. M.P. Pandey, Ph.D., Ex. Vice Chancellor, BAU, Ranchi & IGKV, Raipur and Director General, IAT, Allahabad, India
Dr. Martin Mortimer, Ph.D., Professor, The Centre of Excellence for Sustainable Food Systems, University of Liverpool, United Kingdom
Dr. Muneshwar Singh, Ph.D., Project Coordinator AICRP- LTFE, ICAR - Indian Institute of Soil Science, Bhopal, India
Prof. Omkar, Ph.D., Professor, Department of Zoology, University of Lucknow, India
Dr. P.C. Srivastav, Ph.D., Professor, Department of Soil Science, G.B. Pant University of Agriculture and Technology, Pantnagar, India
Dr. Prashant Srivastava, Ph.D., Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, University of South Australia, Australia
Dr. Puneet Srivastava, Ph.D., Director, Water Resources Center, Butler-Cunningham Eminent Scholar, Professor, Biosystems Engineering, Auburn University, U.S.A.
Dr. R.C. Chaudhary, Ph.D., Chairman, Participatory Rural Development Foundation, Gorakhpur, India
Dr. R.K. Singh, Ph.D., Director & Vice Chancellor, ICAR-Indian Veterinary Research Institute, Izatnagar, U.P., India
Prof. Ramesh Kanwar, Ph.D., Charles F. Curtiss Distinguished Professor of Water Resources Engineering, Iowa State University, U.S.A.
Dr. S.N. Maurya, Ph.D., Professor (Retired), Department of Gynecology & Obstetrics, G.B. Pant University of Agric. & Tech., Pantnagar, India
Dr. Sham S. Goyal, Ph.D., Professor (Retired), Faculty of Agriculture and Environmental Sciences, University of California, Davis, U.S.A.
Prof. Umesh Varshney, Ph.D., Professor, Department of Microbiology and Cell Biology, Indian Institute of Science, Bangalore, India
Prof. V.D. Sharma, Ph.D., Dean Academics, SAI Group of Institutions, Dehradun, India
Dr. V.K. Singh, Ph.D., Head, Division of Agronomy, ICAR-Indian Agricultural Research Institute, New Delhi, India
Dr. Vijay P. Singh, Ph.D., Distinguished Professor, Caroline and William N. Lehrer Distinguished Chair in Water Engineering, Department of Biological Agricultural Engineering, Texas A&M University, U.S.A.
Dr. Vinay Mehrotra, Ph.D., President, Vinlax Canada Inc., Canada

Editor-in-Chief

Dr. Manoranjan Dutta, Head Crop Improvement Division (Retd.), National Bureau of Plant Genetic Resources, New Delhi, India

Managing Editor

Dr. S.N. Tiwari, Ph.D., Professor, Department of Entomology, G.B. Pant University of Agriculture and Technology, Pantnagar, India

Assistant Managing Editor

Dr. Jyotsna Yadav, Ph.D., Research Editor, Directorate of Research, G.B. Pant University of Agriculture and Technology, Pantnagar, India

Technical Manager

Dr. S.D. Samantray, Ph.D., Professor, Department of Computer Science and Engineering, G.B. Pant University of Agriculture and Technology, Pantnagar, India

CONTENTS

Studies on genetic diversity and character association analysis in wheat (<i>Triticum aestivum</i> L. em. Thell)	337-344
P. SINGH, B. PRASAD, J. P. JAISWAL and A. KUMAR	
Study of Genetic Variability for yield and yield contributing characters in Bread Wheat (<i>Triticum aestivum</i> L.)	345-348
SHIVANI KHATRI, RAKESH SINGH NEGI and SHIVANI NAUTIYAL	
To assessment about the combining ability and heterosis studies in pea [<i>Pisum sativum</i> L. var. <i>hortense</i>]	349-355
AKASH KUMAR, BANKEY LAL, P. K. TIWARI, PRANJAL SINGH and ASHUTOSH UPADHYAY	
Effect of integrated nutrient management on growth, yield, and quality traits in garden pea (<i>Pisum sativum</i> L.) under sub-tropical conditions of Garhwal hills	356-364
SUMIT CHAUHAN, D. K. RANA and LAXMI RAWAT	
To study of correlation and path coefficients analysis for pod yield in garden pea [<i>Pisum sativum</i> L. var. <i>hortense</i>]	365-370
CHANDRAMANI KUSWAHA, H. C. SINGH, BANKEY LAL, PRANJAL SINGH and ASHUTOSH UPADHYAY	
Black gram (<i>Vigna mungo</i> L.) response to plant geometry and biofertilizers in western Himalayan Agroecosystem	371-375
SANDEEPTI RAWAT, HIMANSHU VERMA and J P SINGH	
Integrated effect of natural farming concortions, organic farming practices and different fertilizer doses on productivity and profitability of wheat in western Himalayan zones of India	376-382
PRERNA NEGI, HIMANSHU VERMA, MOINUDDIN CHISTI, J. P. SINGH, PRIYANKA BANKOTI, ANJANA NAUTIYAL and SHALINI CHAUDHARY	
Economics of paddy cultivation in the salinity affected regions of Alappuzha district, Kerala	383-390
NITHIN RAJ. K, T. PAUL LAZARUS, ASWATHY VIJAYAN, DURGA A. R, B. APARNA and BRIGIT JOSEPH	
Persistent toxicity of insecticides, fungicides, and their combinations against <i>Spodoptera litura</i> (Fab.) on soybean	391-395
GUNJAN KANDPAL, R.P. SRIVASTAVA and ANKIT UNIYAL	

Productive and reproductive performance of dairy animals in district Varanasi of Uttar Pradesh RISHABH SINGH , YASHESH SINGH and PUSHP RAJ SHIVAHRE	396-400
Role of nanotechnology in environmental pollution remediation A.K. UPADHYAY, ANUPRIYA MISRA, YASHOVARDHAN MISRA and ANIMESH KUMAR MISHRA	401-408
Effects of chemical industry effluents on humoral immune response in mice SEEMA AGARWAL and D.K. AGRAWAL	409-415
Correlation between sero-conversion and clinical score in Peste des petits ruminants disease in goats AMISHA NETAM, ANUJ TEWARI, RAJESH KUMAR, SAUMYA JOSHI, SURBHI BHARTI and PREETINDER SINGH	416-419
Length weight relationship and condition factor of Bengal corvina, <i>Daysciaena albida</i> (Cuvier, 1830) from Vembanad Lake KITTY FRANCIS C. and M. K. SAJEEVAN	420-424
Temporal changes in per capita consumption of meat in different countries of South East Asia region ABDUL WAHID and S. K. SRIVASTAVA	425-431
Temporal analysis of milk production and consumption in the Central Asian countries ABDUL WAHID and S. K. SRIVASTAVA	432-436
Development and quality evaluation of jackfruit rind incorporated vermicelli <i>Payasam</i> ATHIRA RAJ, SHARON, C.L., SEEJA THOMACHAN PANJIKKARAN., LAKSHMI, P.S., SUMAN, K.T., DELGI JOSEPH C. and SREELAKSHMI A. S	437-443
Optimizing pre-drying treatments of kale leaves for enhanced processing quality BINDVI ARORA, SHRUTI SETHI, ALKA JOSHI and AJAY NAROLA	444-452
Effect of training and visit (T & V) system on fish production (Aquaculture) in Ogun State, Nigeria UWANA G.U. and V.E OGBE	453-459
Use of social media by rural and urban youths: A study in Uttarakhand ANNU PARAGI and ARPITA SHARMA KANDPAL	460-465
Assessment of traditional knowledge of therapeutic potential of native crops among population of Udham Singh Nagar, Uttarakhand A. DUTTA, A. BHATT, S. SINGH and K. JOSHI	466-472
Modernizing dairy operations: A comprehensive case study of mechanization in Bhopal farms M. KUMAR	473-477

Assessment of traditional knowledge of therapeutic potential of native crops among population of Udham Singh Nagar, Uttarakhand

A. DUTTA, A. BHATT*, S. SINGH and K. JOSHI

Department of Food Science and Nutrition, College of Home Science, G. B. Pant University of Agriculture and Technology, Pantnagar-263145 (U. S. Nagar, Uttarakhand)

**Corresponding author's e-mail id: bhattankita.gbpuat@gmail.com*

ABSTRACT: A study was conducted to assess the traditional knowledge of therapeutic potential of native crops among population of Udham Singh Nagar Uttarakhand. A structured questionnaire vetted by experts and pretested through a pilot study was developed for the study. Data on demographic characteristics, knowledge about hill crop, knowledge about their therapeutic value and their role in disease management was studied. Knowledge assessment of different categories of hill produce (cereals, vegetables, fruits, pulse, oil seeds) showed low levels of knowledge. Barring few produce (spinach, ginger and horse gram) a low percentage of people knew about multiple therapeutic uses of hill crops. Most of the respondents fell in the average group of knowledge on scoring basis. Education qualification had a positive significant relationship with the knowledge of the respondents. The study revealed that lack of awareness about therapeutic crops is the main constraint for their use and popularization.

Key words: Knowledge, therapeutic use, traditional crops, Uttarakhand

Uttarakhand is blessed with a rare-biodiversity with 175 rare species of aromatic and medicinal plants. Due to its varied agro-climatic zones, it is amenable to a variety of commercial opportunities in horticulture, floriculture and agriculture (Kumar *et al.*, 2018). It is the hub of therapeutic crops which can be used to curb many chronic diseases. Despite of availability of all the foods that were traditionally consumed for maintaining a healthy lifestyle, today people are moving towards western culture in their food habits. It was believed that the traditional foods were associated with balanced diet with essential nutrient availability (Agnihotri *et al.*, 2023). Due to a shift of dietary habits, today there is very little awareness about the traditional crops and their nutritional benefits in our daily life which can safeguard us from the diseases. Therapeutic uses of crops have been studied but there is no such exclusive study indicating the knowledge level of local population about this.

The study has been conducted in Udham Singh Nagar district of Uttarakhand that lies between 28° 53' N and 29° 23' N latitude (Central Ground Water Board, 2023) that stands to the south of Nainital district. As the soil is incredibly fertile, agriculture

is the main occupation of the local population. The present study on therapeutic foods that are grown in Uttarakhand was carried out to assess the overall awareness of people about therapeutic foods and see the impact of various demographic factors on the knowledge of the people about therapeutic crops of Uttarakhand.

MATERIALS AND METHODS

The U.S. Nagar was selected as study area as it is the food bowl of state of Uttarakhand. The sample size of the study was 150 respondents. Information was gathered using a structured questionnaire for which field visits were organized. Data has been collected on the following four aspects related to knowledge of therapeutic foods of the people in the study area- Background information of the respondents; Respondent's knowledge about hill crops; Respondents knowledge about the therapeutic uses of hill crops; Impact of demographic characteristics of the respondents on the knowledge regarding therapeutic crops.

The data obtained was tabulated in MS Excel sheet. Appropriate statistical tools such as frequency,

percentage, mean, standard deviation, coefficient of correlation and test of significance were used to analyze the data and draw out inferences, trends, patterns and conclusion.

To calculate the overall knowledge of the respondents about the therapeutic use of hill crops, their responses were scored on the basis of their awareness about the health benefit/disease associated with the particular food item. The responses of their awareness regarding health benefits of the food item were obtained on two-point continuum namely 'Yes' and 'No' with weightage of '1' and '0' respectively. In addition, response on all the health benefits of food items was summed up individually. The summated score of the respondents provided the total score and was categorized into three categories as 'Less' (i.e. less than 5), 'Average' (i.e. between 5 to 15) and 'High' (i.e. more than 15) on the basis of calculated Mean (10.1) and Standard Deviation (14.8) (Bhairamkar *et al.*, 2011).

RESULTS AND DISCUSSION

Background information of the respondents

The results of the study were presented and discussed under broad headings viz. gender, age and qualification (Table 1).

Table 1: Distribution of respondents on the basis of demographic characteristics (N=150)

Category (Range)	%
Gender	
Male	58.67
Female	41.33
Age	
<16	-
16 – 25	22.67
26 – 35	17.33
36 – 45	15.33
46 – 55	20.67
56 – 65	13.33
>65	10.67
Qualification	
Primary	11.33
Upper primary	04.00
High School	10.00
Intermediate	14.00
Graduate	32.67
Post-graduate and above	28.00

Gender: Out of 150 respondents the male and female members were 58.67% and 41.33% respectively.

Age: Out of 150 respondents, 22.67% people fell in 15 to 25 years of age group, 17.33% people in the age group of 26 to 35 years, 15.33% people belonged to the age group of 36 to 45 years of age, 20.67% people fell in the age group of 46 to 55 years, 13.33% respondents belonged to the age group of 56 to 65 years. The minimum i.e. 10.67% respondents belonged to more than 65 years of Age group. It may be concluded that the maximum respondents (22.67%) belonged to the age group of 15 to 25 years.

Education Qualification: The results indicated that the maximum respondents were graduates (32.67%) followed by post graduates (28.00%), then intermediate (14.00%), and primary level qualification (11.33%).

Out of 150 respondents, 66.67% had knowledge about the crops of hill region, whereas, rest 33.33% of them did not have any knowledge regarding these crops.

Respondent's knowledge about hill crops

In the results of the study, knowledge about crops of hill region was grouped under the cereals, vegetables, fruits, pulses and oil seeds (Table 2).

Cereals: The maximum number of respondents i.e., 41.33 percent had knowledge about Finger millet (Mandwa), followed by Pearl millet (Bajra) (10.00%), Barnyard millet (Jhangora) (6.67%) and Maize (04.00%). Minimum respondents (3.33%) had knowledge about Sawa (Japanese millet).

Vegetable: In the category of vegetables 20.00% respondents had knowledge about Spinach. Respondents knew about Cucumber (16.67%), Marrow (04.00%), Bottle gourd (9.33%), Beans (10.00%), Peas (14.00%), Carrot (4.67%), Raddish (4.67%), Rape seed (Rai) (17.33%), Capsicum (12.00%), Lesora (Sebesten plum) (4.67%), Gathi/Gaderi (Giant *Colocasia*) (15.33%), Broccoli (02.00%), Ginger (02.00%), Potato (1.33%). Minimum respondents i.e., 0.67% had knowledge

Table 2: Distribution of respondents on the basis of their knowledge about crops of hilly region (N=150)

Knowledge about Crops of hilly region		
S.No.	Name of the crop	%
<i>Cereals</i>		
1.	Finger millet	47.33
2.	Maize	4.00
3.	Pearl millet	10.00
4.	Barnyard millet	6.67
5.	Sawa (Japanese millet)	3.33
<i>Vegetables</i>		
1.	Spinach	20.00
2.	Cucumber	16.67
3.	Marrow	4.00
4.	Bottle gourd	9.33
5.	Beans	10.00
6.	Peas	14.00
7.	Carrot	4.67
8.	Raddish	4.67
9.	Rai (Rape seed)	17.33
10.	Ramdana/Chaulai	17.33
11.	Capsicum	12.00
12.	Lesora (Sebesten plum)	4.67
13.	Gathi/Gaderi (Giant colocassia)	15.33
14.	Broccoli	2.00
15.	Ginger	2.00
16.	Potato	1.33
17.	Jackfruit	0.67
18.	Pinalu (Greatleaved Caladium)	0.67
19.	Thadu (Taro)	0.67
<i>Fruits</i>		
1.	Strawberry	18.00
2.	Plum	22.67
3.	Box berry	24.67
4.	Apple	21.33
5.	Apricot	32.00
6.	Almonds	22.00
7.	Peach	30.00
8.	Walnut	23.33
9.	Litchi	9.33
10.	Orange	35.33
11.	Pear	11.33
12.	Kiwi	16.67
13.	Cherry	8.00
14.	Lemon	19.33
15.	Hisalu (Golden himalayan raspberry)	12.67
16.	Kilmora (Nilgiri barberry)	4.00
17.	Pomegranate	2.00
18.	Mulberry	1.33
19.	Buransh (Rhododendron)	2.67
<i>Pulses</i>		
1.	Horse gram (Gahat)	18.67
2.	Bhatt (Black bean)	14.00
3.	Lobia (Black-eyed peas)	0.67
4.	Raens	1.33
<i>Oil seeds</i>		
1.	Soybean	1.33

about Jackfruit, Pinalu (Greatleaved Caladium) and Thadu (Taro).

Fruit: The maximum respondents (35.33%) had knowledge about citrus fruits (Orange, Malta, etc.). 32% respondents had knowledge about Apricot, followed by Peach (30.00%). Respondents had knowledge about Strawberry (18.00%), Plum (22.67%), Box berry (*Myrica esculentica*) (24.67%), Apple (21.33%), Almonds (22.00%), Walnut (23.33%), Litchi are 9.33%, Pear are 11.33%, Kiwi are 16.67%, Cherry are 8.00%, Lemon are 19.33%, Golden himalayan raspberry (*Rubus ellipticus Sm.*) are 12.67%, Nilgiri barberry (*Barberis asiatica*) are 4.00% and Pomegranate are 2.00%. Minimum no. of respondents had knowledge about the Mulberry i.e., 1.33%.

Pulse: Maximum number of respondents (18.67%) had knowledge about the Horse gram (*Macrotyloma uniflorum*) 14.00% respondents had knowledge about Black bean (Bhatt), 1.33% respondents had knowledge about Raens and the least percentage which is 0.67% knew about Black-eyed peas (Lobia). *Oil Seeds:* Only 1.33% people had knowledge about the Soybean.

Respondents knowledge about the therapeutic uses of hill crops

It was assessed in the study that the awareness of respondents regarding the therapeutic potential of common hill produce. The generated information is shown in Table 3 and discussed below:

Turmeric: The 28.67% and 36% of respondents said that turmeric had pain killing and wound healing properties respectively. 34.67% respondents mentioned about the efficacy of turmeric in curing arthritis and joint pain. Very few respondents were aware about the importance of turmeric in the treatment of heart diseases, cancer and cholesterol related problems. Also, 4.67% respondents informed about the use of turmeric in the treatment of diabetes.

Banana: More than a quarter of the respondents (i.e., 29.33%) said that banana is used for weight gain and calcium deficiency. 18% of them were aware

Table 3: Distribution of respondents on the basis of their awareness about health benefits of food items (N=150)

S. No	Food items	Health benefits/ Disease	%
1	Turmeric	Painkiller	28.67
		Arthritis & joints pain	34.67
		Heart problems	2
		Antiseptic	14.67
		Cholesterol lowering effect	2
		Cough and Cold	21
		Cancer	2
		Diabetes	4.67
		Wound healing	36
		Constipation	7.33
		Energy giving food	18
2	Banana	Weight gain	29.33
		Heart disease	4
		Calcium deficiency	29.33
		Iron deficiency	5.33
		Stomach disorders	6.67
		Hypertension	2
		Indigestion	38.67
		Loose motion	30.67
3	Curd	Cholesterol	0.67
		Hypertension	8
		For cooling	1.33
		Stomach disorders	24.67
		Diabetes	17.33
		Skin and hair problems	3.33
		Anaemia	93.33
4	Spinach	Skin, Heart, Eye and Hair problems	18.67
		Diabetes	2.67
		Cough and Cold	92
5	Ginger	Fever	24
		Headache	28
		Diabetes	2.67
		Cancer	2
		Immunity Booster	6.67
		Respiratory disease	2
6	Coarse grains	Stomach disorders	36.67
		Diabetes	34
		Hypertension	22.67
		Constipation	34.67
		Cholesterol	4
		Cancer	9.33
		Piles	1.33
		Heart disease	8
		Malnutrition	2.67
		Stone problem	75.33
7	Gahat (Horse gram)	Fever	4.67
		Diabetes	52
8	Walnut	Heart disease	21.33
		Hypertension	29.33
		Memory loss	11.33
		Cancer	10.67
		Cholesterol	6.67
		Weight control	3.33
		Joint pain	4

Table 4: Categorization of respondents on the basis of their awareness of therapeutic uses of hill crops (N=150)

S. No.	Category (Range)	%
1.	Less (<5)	7.33
2.	Average (5-15)	78.67
3.	High (>15)	14

(Mean= 10.1; S.D.=14.8)

Table 5: Correlation and t - calculated values of the independent and dependent variables (N=150)

S. No.	Demographic characteristics	Correlation coefficient (r)	t-calculated
1.	Gender	0.09	1.10
2.	Age	0.10	1.23
3.	Education Qualification	0.36*	4.71

*Significant at 0.01 level of probability; t-value at 0.01 level of significance (df = 183) = 2.576, **Significant at 0.05 level of probability; t-value at 0.05 level of significance (df = 183) = 1.960

that it is a good source of energy. 5.33% and 6.67% respondents had knowledge about banana, being used in the treatment iron deficiency and stomach disorders respectively, while very few (2.00%) said that it can be used in hypertension.

Curd: A large number of respondents (38.67% and 30.67%) said that curd is very effective in management of indigestion and loose motion problems respectively. A few of them (1.33%) mentioned that curd has cooling effect in the body and some mentioned that it can be effective in the management of skin and hair problems (3.33%).

Spinach: Maximum respondents (93.33%) mentioned that spinach can be used in the treatment of anemia. Whereas, 18.67% of respondents mentioned that spinach is used in treatment skin, heart, eyes and hair related problems. Only 2.67% of respondents agreed on its role in the treatment of diabetes.

Ginger: The majority (92.00%) of the respondents said that ginger can provide relief from cough and cold. Very few individuals (2.2% and 6.67% respectively) mentioned that ginger is efficient in the treatment of cancer and respiratory diseases and

can be used as an immunity booster.

Coarse grains: About 36.67% of respondents mentioned that coarse grains like pearl millet, finger millet and barnyard millet are effective in the treatment of stomach disorders. The use of coarse grains in the treatment of diabetes was supported by 34% of the respondents. Further, 22.67% and 4.00% of respondents said that coarse grains provide relief in problems related to hypertension and cholesterol respectively. Only a few, i.e., 1.33% respondents knew that coarse grains are used in treatment of piles.

Horse gram: The 73.33% and 04.67% respondents knew that horse gram is used as therapeutic food in the treatment of stone problem and fever respectively.

Walnut: Maximum (57%) respondents said that walnut is used in the treatment of Diabetes. 29.33%, 21.33% and 11.33% of respondents had knowledge about walnut in the treatment of hypertension, heart disease and memory loss respectively. Only 3.33% respondents had knowledge about the use of walnut in weight management.

In-depth statistical analysis of respondents knowledge about the therapeutic uses of hill crops has been carried out. The findings regarding the respondents' knowledge about the therapeutic uses of hill crops are given in Table 4 and Fig.1.

The summated score of the respondents have been categorized into three categories as 'Less' (i.e less than 5), 'Average' (i.e. between 5 to 15) and 'High' (i.e. more than 15) on the basis of calculated Mean (10.1) and Standard Deviation (14.8) Table 4.

It was found that majority (78.67%) of the respondents had average knowledge about therapeutic use of hill crops; whereas 14 percent had high knowledge and remaining 7.33 percent respondents had low knowledge on role of therapeutic crops. This indicated that efforts should be made to increase the knowledge of the respondents regarding therapeutic uses of hill crops.

Impact of demographic characteristics of the respondents on their knowledge status regarding therapeutic crops

An attempt was made to determine the relationship of demographic characteristics and knowledge status regarding therapeutic crops. The results obtained were presented in the Table 5.

Gender

Gender of the respondents was found to be positively related with the knowledge regarding therapeutic crops. The value of correlation coefficient (r) was found to be 0.09, and the relationship was found to be non-significant.

The positive and non-significant correlation between knowledge regarding therapeutic crops and gender of the respondents indicated that there is a mild difference between knowledge status of males and females. A positive relationship depicted that women know more about the therapeutic use of the crops than men. The findings of the study are in line with Torres-Aviles *et al.* (2016).

Age

Age of the respondents was found to be positively related with their knowledge regarding therapeutic crops ($r = 0.10$). It was found that the relationship between the two variables was non-significant.

The positive and non-significant correlation between knowledge regarding therapeutic crops and age of the respondents indicated that age does not impact the level of knowledge about the therapeutic role of crops. The findings of the study were in line with

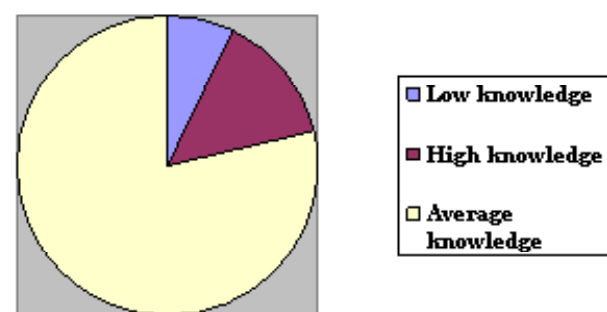


Fig. 1: Distribution of respondents on the basis of knowledge about therapeutic use of hill crops (N=150)

Wayland and Walker (2014).

Education Qualification

Education qualification of the respondents was found to be positively related with their knowledge regarding therapeutic crops. The value of correlation coefficient (r) was found to be 0.36, and the relationship was found to be significant at 0.01 level of probability.

The positive and significant correlation between knowledge regarding therapeutic crops and qualification of the respondents indicated that respondents with higher education displayed high score in knowledge. The result of the study was in line with that of Wassie *et al.* (2015).

CONCLUSION

The study was conducted to assess the traditional knowledge of therapeutic potential of native crops among 150 respondents (majority of whom were males) in Udham Singh Nagar, Uttarakhand. Most of the respondents were young graduate adults who had knowledge about hill crops in general. When it came to cereals the respondents knew about finger millet with very few respondents having knowledge about other cereals. Negligible percentage of respondents had knowledge about traditional vegetables; the same was seen for fruits, pulses and oil seeds. Assessment of therapeutic uses of hill crops revealed that spinach as a treatment for anaemia was known by almost all the respondents followed by ginger for management of cold and cough and the use of horse gram for treatment of stones. Therapeutic uses of banana (for weight gain) were not so well known by the respondents. Categorization of the knowledge level of respondents put most of them in the average category. Impact of demographic variables on the knowledge level of the respondents revealed that gender and age did not have a significant impact but qualification showed a significant positive effect. It may be concluded that the knowledge level of therapeutic potential of native crops among the people studied was not satisfactory. Therefore, efforts are required to revive the traditional

knowledge of hill crops to ensure healthy living of the people in the area under investigation.

ACKNOWLEDGEMENTS

The authors acknowledge with thanks the Directorate of Experiment Station, G.B. Pant University of Agriculture and Technology, Pantnagar for funding the project entitled "Development of therapeutic foods from hill produce of Uttarakhand".

REFERENCES

- Agnihotri, V., Rana, S., Anjum, S., Bhatt, I. D. and Kumar, K. (2023). Nutritional journey of traditional foods of Uttarakhand. GBPNIHE, Almora, G.B. Pant National Institute of Himalayan Environment. https://www.researchgate.net/publication/369912667_Nutritional_journey_of_traditional_foods_of_Uttarakhand
- Bhairamkar, M. S., Hardikar, D. P., Kadam, J. R. and Patil, V. G. (2011). Quantification of variables and various scales in extension education. (Jain Brothers, New Delhi), 106 p
- Central Ground Water Board (2023). District Udham Singh nagar at a Glance. Retrieved on 12.07.2023 from http://cgwb.gov.in/district_profile/uttarakhand/udhamsinghnagar.pdf
- Kumar, A., Kumar, R., Sharma, M., Kumar, U., Gajula, M. N. V. P. and Singh, K. P. (2018). Uttarakhand Medicinal Plants Database (UMPDB): A Platform for Exploring Genomic, Chemical, and Traditional Knowledge. *Data*, 3(1):7 p. <https://doi.org/10.3390/data3010007>
- Torres-Avilez, W., de Medeiros, P. M. and Albuquerque, U. P. (2016). Effect of Gender on the Knowledge of Medicinal Plants: Systematic Review and Meta-Analysis. *Evidence-Based Complementary and Alternative Medicine*, 2016, 13. doi: 10.1155/2016/6592363
- Wassie, S. M., Aragie, L. L., Taye, B. W. and Mekonnen, L. B. (2015). Knowledge,

Attitude, and Utilization of Traditional Medicine among the Communities of Merawi Town, Northwest Ethiopia: A Cross-Sectional Study. *Evidence- Based Complementary and Alternative Medicine*. 7. doi: 10.1155/2015/138073.

Wayland, C. and Walker, L. S. (2014). Length of residence, age and patterns of medicinal plant knowledge and use among women in the urban Amazon. *Journal of Ethnobiology and Ethnomedicine*, 10: 11.

Received: September 26, 2023

Accepted: December 13, 2023