

Development of An Entrepreneurship through Highly Demandable Organic Spices Farming for the Women Empowerment of Border District Uttarkashi (Uttarakhand)

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Abstract: *The spices played a major role in the lifestyle of Indian peoples from a time to time. The spices played different roles such as colouring of food, flavours, preservatives, food addictive and in form of medicines used by the peoples. The spices enhance culinary experience and cultural backgrounds of the individuals. This study is to present cultivate and produced the most highly demandable and high yielding variety of spices in the area of 5 villages of Border District, Uttarkashi. It is also widely consumed spices in the Indian household and analyzed farmers/ beneficiaries awareness and preference for spices cultivation, so in the area developed entrepreneurship for the livelihoods of beneficiaries. Spices are providing an alternative source of income by supply to local and market level, thereby reduce the financial need of poor & marginal farmers of area by cultivation of spices through organic farming and developed entrepreneurship. Demands of organic farming of local spices are increasing the interest of farmers and other farmers of area are attracted and benefited. Spices cultivation & associated activities have high potential in providing high employment to farmers & pushing economic growth in resource constrained areas. Farmers of area are potential target groups to be trained on various aspects for strengthening of spices cultivation, production and marketing. Research is providing the maximum benefits and playing a major role for the socio-economic and ecological development in area. The beneficiaries capture to the market and this research is going to help them in generating good income. High demandable spices such as Ginger, Garlic, Cinamonanum, Coriander and Turmeric are cultivating in rural areas through the technology of organic farming for their livelihoods.*

Keywords: Organic spices cultivation, Livelihoods, farmers, Empowerment and Entrepreneurship development

1. Introduction

Spices have many more uses than just adding flavor to the food and these plant-derived compounds have recently become attractive due to their many functional qualities and potential health benefits as was reported by Sharma *et al.*, (2017). The spices are used in food preparation as sources of natural colour, flavor and aromatic preservative ingredients and have been used by humankind for a long time. Spices contain several valuable naturally occurring phytochemical components with bioactive effects and medicinal and functional properties such as antimicrobial, anti-inflammatory, antioxidant, anti-allergic and immune modulator properties as was noted by Barak & Mudgil, (2022). Carlsen *et al.*, (2010) analyzed 3100 types of foods, beverages and spices are richest source of antioxidants among the plant origins.

Recent scientific studies have been focused on turmeric (*Curcuma longa*) and curcumin. Turmeric (*Curcuma longa*) and curcumin modulates signaling pathways to act as an antioxidant and anti-inflammatory agent intracellular as was reported by Priyadarsini *et al.*, (2014). The many studies have been examined its ability to prevent and manage chronic diseases. Curcumin regulates anti-inflammatory, oxidative and anti-apoptotic pathways, which may benefit cardiovascular health as was observed by Zamzuri *et al.*, (2023). Moreover, curcumin capacity to alter key molecules involved in acetylcholine esterase inhibition, anti-oxidation

and amyloid-beta inhibition protects patients with neurodegenerative diseases. Cinnamon, fenugreek and turmeric may improve glucose metabolism and insulin sensitivity as was noted by Sanlier and Gencer *et al.*, (2020). Spices antioxidant and antibacterial characteristics make them appealing alternatives to synthetic additives, meeting consumer demand for clean-label products. Essential oils from spices offer antibacterial properties against bacteria, molds and yeasts as was observed by Barak & Mudgil *et al.*, (2022). The adding of spices to food improves taste and function, texture, appearance, odor and colour have been examined as was notified by Senay *et al.*, (2014). Efficacy and consistency of spices in food applications might also vary depending on geographical origin, processing methods and storage conditions.

The spices can be buds and flowers (saffron, cloves etc), leaves (coriander, mint, etc), plant bark (cinnamon etc), roots (turmeric & ginger), fruits (cloves, chili and black pepper etc), seeds (fennel, fenugreek, mustard, cumin, coriander) and bulbs (onion, garlic) as was observed by Sanlier and Gencer *et al.*, (2020). Both enhance the flavour and aroma of food and dried spices possess a more intense flavor as was recorded by Anil *et al.*, (2023). There are 21,000 plants used as medicines worldwide as listed by the World Health Organization (WHO). Of these, 2500 species are found in India and 150 are grown widely as was noted by Sharma *et al.*, (2017).

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Turmeric is a rhizomatous herbaceous perennial plant (*Curcuma longa*) of the ginger family (Nelson *et al.*, 2017) and it has relief effects for many health conditions and diseases. Curcumin is a natural polyphenol, that is extracted from a type of turmeric as was observed by Nelson *et al.*, (2017) and its functions intracellular as an antioxidant and anti-inflammatory substance by regulating various signaling pathways (Priyadarsini *et al.*, 2014). Daily spicy food consumption showed a 14% lower risk of death compared to consumption of once per week or less. Similarly, spicy food consumption was correlated with a decreased risk of death from various health conditions like cancer, respiratory and heart diseases as was noted by Jiang, (2019) and Khazdair *et al.*, (2019). Chili pepper species, such as *Capsicum annum* have been extensively used in Mexican and Asian traditional cuisines. They provide pungency and enhance flavour in food dishes, marinades, salads and sauces. The regular consumption of spices may significantly enhance overall health and potentially mitigate the risk of developing cancer (Jiang, 2019). Hossain *et al.*, (2022) have reported such as ginger, turmeric, garlic, fenugreek etc having potential mechanisms for inhibiting the growth of colorectal cancer cells and spices can lower blood cholesterol levels and increase HDL levels (Sharma *et al.*, 2017).

Turmeric exhibits an anti-inflammatory property due to the elevated amounts of bioactive polyphenols of curcuminoids, regulate different mechanisms to protect against cardiovascular diseases (Elbaset *et al.*, 2022 and Zamzuri *et al.*, 2023). Elbaset *et al.*, (2022) added that Curcumin has antihyperlipidemic, anti-hyperglycemic and antioxidant properties protect against hepatic and cardiac problems. Garlic is also one of most used spices and has potential health benefits. It was found that there was a remarkable reduction in cholesterol and LDL-cholesterol levels and increased HDL levels in hyperlipidemia patients. Garlic consumption could inhibit inflammation and lipid accumulation in patients as was noted by Tsui *et al.*, (2018).

Coriander is a widely grown herb worldwide, abundant in essential oils important for brain function and growth. Consumption a daily fresh leaf extract added to tea drinks or crushed seeds of coriander before sleep may relieve anxiety, stress, depressive disorders, difficulties in sleeping & insomnia (Oraon *et al.*, 2017). Spices contain polyphenols that impact glucose metabolism as glucose uptake in the intestine, regulation of insulin secretion, and regulation of hepatic glucose production. Not all spices contain identical amounts of phenolic compounds due to variety and the synergistic effect between the spices is variable, leading to a complex effect on diabetes (Gupta *et al.*, 2017). Turmeric extract (curcumin) induces an antidiabetic impact by controlling glucose metabolism and exhibiting anti-inflammatory and anti-oxidative effects. Spices have beneficial effects against liver diseases.

Numerous studies have demonstrated the benefits of spices, particularly curcumin, in raising HDL cholesterol (high-density lipoprotein cholesterol) and lowering LDL cholesterol (low-density lipoprotein cholesterol) as well as in reducing lipid peroxidation and atherosclerosis (Naseri *et al.*, 2022). Curcumin has a significantly impacts on hepatic

disorders associated with non-alcoholic fatty liver disease (NAFLD) (Naseri *et al.*, 2022).

Antioxidants are organic compounds that protect food from degradation, rancidity and discoloration due to oxidation of fats and lipids. Antioxidants derived from herbs and spices as phenolic compounds, flavonoids, phenolic diterpenes, essential oils, sulfur-containing compounds, tannins, alkaloids and vitamins (Yashin *et al.*, 2017). Mashabela *et al.*, (2022) demonstrated that ginger extract possesses a high polyphenol content and exhibits antioxidant activity against lipid oxidation. They also confirmed the thermal stability of ginger extract during prolonged heating (185 °C) and it can be used in thermal processes and added during frying to inhibit lipid oxidation.

Several studies demonstrate that spices have antimicrobial activity against microorganisms such as viruses, bacteria, molds, and yeasts. As a result, they prolong the shelf life and enhance the stability of food products and essential oil in spices was found to have antimicrobial properties (Barak & Mudgil *et al.*, 2022). Several spices characterized by Mashabela *et al.*, (2022) can be used as preservatives in different food industries. Ginger extract showed inhibition to the development of colon bacteria besides other pathogens such as *Salmonella*, *Staphylococci*, *Proteus spp*, *Streptococci* and *E. coli* in addition to the antifungal activity as *Aspergillus* (Wang *et al.*, 2023 and Xuwen *et al.*, 2023). The most common flavoring spices with antimicrobial properties are oregano, rosemary, ginger, mint, basil, garlic, onion, black pepper, mustard, coriander, cinnamon and cumin etc (Senay, 2014).

Senay (2014) reported some sensory effects on food products after adding spices. Furthermore, adding coriander powder to the wheat flour enhances the antioxidant content and enhances the sensory quality of flavour, mouth feel, colour, and texture. Food industries utilize different spices in powder, fresh, extract and essential oil forms to produce new, innovative, and improved functional food products associated with health benefits using antioxidants and antimicrobials, increases nutritional value and improves sensory attributes. Barak and Mudgil *et al.*, (2022) were noted that adding coriander extract to ghee enhances its antioxidant activity and provides superior oxidative stability. Therefore, the present research is explored the spices cultivation, production and entrepreneurship development among the 20 farmers of border District Uttarkashi for their livelihoods.

2. Aims and Objective of Present Work

In the present research work, first of all the project team went to the 5 villages of Dunda Block of Uttarkashi District and given the knowledge to the farmers about the project and told them that poor/weaker farmers can improve their livelihood by high yielding variety of spices cultivation, production and entrepreneurship development. Under the research work we have been selected farmers from five villages (Genwala, Baun, Chinakholi, Panjiyala & Jugaldi) of Border District Uttarkashi, Uttarakhand. By the financial support of UCOST Dehradun, a Spice Unit established in the center point of village Genwala of Uttarkashi District, at this

place, the two spices grinding and processing machines were installed by the implementing agency and were given minor equipments/accessories and Germplams/Planting materials like Coriander, Garlic, Turmeric, Zinger, *Cinamonanum* and Biofertilizer etc to the farmers for the cultivation and production of spices and established spice unit for their livelihoods.

Under the research the 40 farmers of the area have been grown spices seeds/Germplams in their fields and grinded by machines, processing and packed the spices in Common Facility Center and sold them in local and in market level for their livelihoods, so increased their income and also increased their socio-economic status. The training programme have been organized among the farmers by research team, Agricultural Experts, Principal of Government College Uttarkashi (Implementing agency) and other professors of Botany Department for their well-being. Implementing agency was given training of Spices cultivation, methods of compost formation, spices production, processing and its marketing strategy for farmer's livelihoods. Therefore, present research work was being proposed to evaluate the following major objectives:

3. Objectives

- 1) To enhancement of farmers especially Women's through the Technology of Organic Farming of Spices cultivation, production and entrepreneurship development.
- 2) To transfer of knowledge and expertise in innovative agricultural practices for the cultivation and production of highly demandable variety of local spices among farmers.
- 3) To engage and trained 40 farmers in the cultivation of spices through the organic farming management practices/biological control.
- 4) To installation of spices machines for the establishment of spices unit at the center point.
- 5) To develop and strength the linkage between beneficiaries and market for the selling of their produce by the development of an Entrepreneur for their livelihoods.

4. Methodology

- 1) Under the research work organized field survey in 5 villages of Dunda block of Uttarkashi District and selected 20 economically weaker farmers for the cultivation of high demandable and high yielding variety of local Spices through the Technology of Organic farming.
- 2) We have conducted awareness, motivation and training programs among farmers for the cultivation of Spices through the organic farming and developed entrepreneur for their livelihoods.
- 3) Restricted the use of chemicals and Farmers trained for the formation of organic manures/green manures, biofertilizer and used disease free seed/Germplams or planting materials for the grown of spice crops.
- 4) Superior quality seeds/Germplams or planting materials purchased from the local people of area and registered agriclinic.

- 5) Implementing agency organized training & awareness programs for the cultivation and processing of spices at centre in collaboration with agricultural experts among the farmers. Spices grinding & processing machines have been installed in center.
- 6) By experts has given marketing information and strategy for the products put on the local and market level for their livelihoods.



Figure 1: Establishment of spices grinding machines at common facility center among farmers/beneficiaries.



Figure 2: Establishment of spices grinding machines at common facility center among farmers.

Table 1.1: Physical properties of soil samples collected at the study area: Soil texture (Physical properties)

Sand (%)	57%
Slit (%)	20%
Clay (%)	30%
p ^H	7.5
Water holding capacity (%)	170%
Moisture content (%)	24.10%

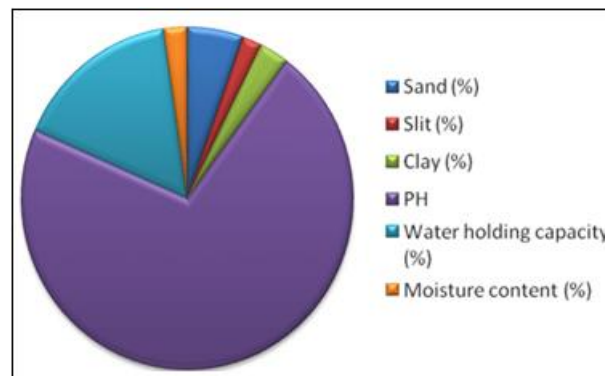


Figure 1.1: Soil texture, moisture content and water holding capacity of the soil of area.



Distribution of planting materials/Germplasm/Seeds to the project beneficiaries for the spices cultivation.



Distribution of planting materials to the farmers and training programme organized by implementing agency among the farmers



Distribution of planting materials to the farmers and training programme organized by implementing agency among the farmers

A. Edaphic condition: Certain physical & chemical properties of soil of the study plots were analyzed for the present investigation (Table.1.1).

Table 1.2: Temperature of the study area during the period January till to June.

Temperature (°C)		
Months	Maximum	Minimum
January	26	14
February	28	20
March	39	23
April	45	28
May	47	35
June	48	32

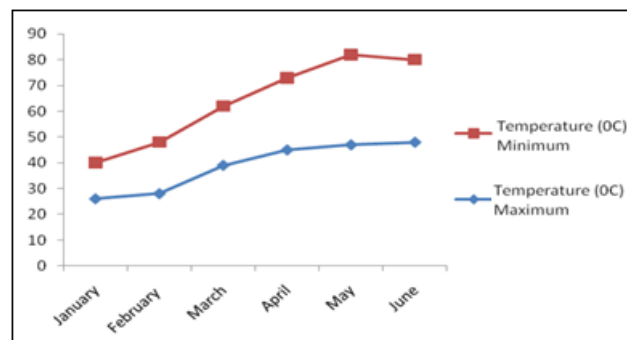


Figure 1.2: Temperature of the study area during the period January till to June

Prepared fields: Under the project by implementing agency has been given training by agriculture experts to the farmers such as field preparation, digging, hoeing, and manufacture of compost materials and irrigation for the cultivation and production of spices for their livelihoods. Under the research work implementing agency has been given seeds/Germplams/planting materials such as Coriander, Garlic, Turmeric and Cinamonanum etc for the cultivation and production of spices. The other consumable materials such as organic biofertilizer/compost materials, irrigation pipe, spray pumps, digger, and strolls etc given to the 20 beneficiaries of project area.

Description of study area: The study site was located in 5 villages of Uttarkashi District of Uttarakhand State. Uttarkashi District is a District of Garhwal division of the Uttarakhand state in Northern India and has its headquarters at Uttarkashi city. Uttarkashi is located at 30.73°N 78.45°E. It has an average elevation of 1,165 meters (4,436 feet) & Most of the topography is hilly. The Uttarkashi District of Uttarakhand State has a mountainous terrain with snow-covered peaks, deep valleys, forests and rivers. The climate varies from cool summers to very cold winters, especially in higher regions. Agriculture, animal husbandry, tourism and pilgrimage-related activities are the main sources of livelihood for the people. Uttarkashi is also known for adventure tourism, including trekking, mountaineering, and river rafting and camping. The people mainly speak Garhwali and Hindi and the local culture includes traditional music, festivals and simple mountain lifestyles. Overall, Uttarkashi district is a place of spiritual significance, natural beauty and cultural heritage.



Map of Study Area (Uttarkashi District)

5. Observations and Results

Under the research work we have been selected 20 farmers of the 5 villages (Baun, Panjiyala, Genwala, Chinakholi & Jugaldi) of the Dunda Block of Uttarkashi District of Uttarakhand State. The beneficiaries of research area are cultivated the spices such as Garlic, Zinger, Turmeric, Coriander and Cinamonanum in their fields. After harvesting of spices he/she grinded and processed in common facility center with the help of installed machines and packed and selling in local and market level for their livelihoods. For the grinding and processing the implementing agency installed grinding, processing and packing machines in the common facility center and beneficiaries generating income by the selling of produces for at the local and market level. By the spice enterprise in the area the each farmer income is 5000 to 6000 per months and yearly is **60,000 to 70,000** respectively. Under this research work, the beneficiaries of the area expressed their gratitude and thanked to the entire members of UCOST Dehradun and entire project team. Therefore, area is known for the organic cultivation of spices and for its marketing at the local and market level. The farmers of area get a good source of income through the cultivation and processing of organic spices, so increased their socio-economic status in the area.





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6. Discussions

Cultivation of Spices is considered to be of great importance for the safeguarding of biodiversity and contribution to farmers/Women's livelihoods in the area. Spices will provide an alternative source of supply to the local and market level and thereby reduce the financial needs of poor and marginal farmers of the area and increased their knowledge by the Cultivation of Spices through the Techniques of Organic Farming and in area developed entrepreneur at local and market level for their livelihoods. The demand of organic farming of spices is increasing the interest of farmers and other farmers of the area are attracted and benefited. Thus, spices cultivation and associated activities have high potential in providing high employment to the farmers & pushing economic growth in that resource constrained areas. The Women's of the area are potential target groups to be trained on various aspects for strengthening of highly demandable local spices cultivation and processing. Intangible benefits of this study are that the beneficiaries/farmers of 5 villages of Uttarkashi District as well as nearby areas also aware about the value of Spices cultivation and its produces. This is ultimately increased the interest of common peoples and their importance in farmers economy by the development of entrepreneur.

In the area, the farmers families cultivating other crops and rearing animals such as cow and sheep, but to get low profit as compared to some other farm income related due to lack of value- added inputs and output. Thus, this project is providing the maximum benefits and would play a major role for the socio-economic and ecological development in area. The beneficiaries capture to the market and thus this project is going to help them in generating good income. By the project activities the farmers especially Women's of the area will be benefited by the cultivation of high demandable spices such as *Ginger, Garlic, Cinamonanum, Coriander and Turmeric* through organic farming in the land of farmers. Cost effective Services will be introduced, less seed, water and less input cost required as compared to conventional methods in respect of seed density, productivity, management practices etc and their cost structure may be significantly different. Green manures, biofertilizer etc introduced with low cost paddy straw was enhanced cultivation, production and soil health. Total innovative, proved and income Generative technology

applied for the cultivation of spices and it is giving double income to farmers and increased yields, improves seed quality, reduced labor cost & area known for the organic spices.

7. Conclusions

The Indian spices play a crucial role in the taste and aroma of Indian cuisine and they also offer health benefits. Indian spices hold a significant place in the daily food diet. The huge variety of spices reflects on the many and various culinary traditions across different regions of India. Consumer demands are also increased for spices which are high-quality products in the local and market level. Spice manufacturers and suppliers have to focus also on packaging, labelling and accessibility with the high-quality of the spices. These spices into your diet can help improve your overall health and reduce the risk of chronic diseases. While raising awareness about the health benefit and having many qualities of spices can further stimulate consumption and encourage their addition in other cuisines. After establishment of spice unit in the area we get the result as increased the market demands of the spices. The Spices are playing major role in international and national market. Therefore, in the area increased the demands of organic spices and income of farmers by the cultivation, production, processing and selling in the local and market level as consumer demands. Spices are not only important for food but also for livelihoods. Millions of farmers, traders, and workers depend on spice cultivation, processing, and trade for their income. The spice industry supports rural communities, creates employment, and contributes to national economies. Therefore, spices play a key role in improving livelihoods and sustaining communities around the world.

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