



E-ISSN: 2278-4136  
 P-ISSN: 2349-8234  
 JPP 2017; 6(5): 1906-1910  
 Received: 07-07-2017  
 Accepted: 08-08-2017

**Saikat Maji**  
 Ph.D Scholar, Dairy Extension  
 Division, ICAR-NDRI,  
 Karnal, Haryana, India

**BS Meena**  
 Principal Scientist, Dairy  
 Extension Division, ICAR-  
 NDRI, Karnal, Haryana, India

## Prospect of organic farming in Uttarakhand: A field level analysis

**Saikat Maji and BS Meena**

### Abstract

Organic farming is rapidly gaining popularity among the farmers throughout the world. It is especially due to concerns about declining trend of quality of natural resources and presence of pollutants in food chain as a reason of decades long external chemical input based intensive farming. In this state organic farming is often seen as only feasible alternative which is supportive to environment, health and sustainability. Uttarakhand, one of the leading states in Organic farming in India, have a predominance of mostly traditional integrated crop livestock farming closed to organic system along with relatively unpolluted ecosystem. The state also have a vast number of certified organic farmers supported by well developed organizational structure for promoting organic farming as well as marketing of organic crop products. The present study analyzed the present and future prospect of organic farming in terms of strengths, weaknesses, opportunities and threats from the standpoint of certified organic farmers of the state. Analytical Hierarchy Process was utilized to quantify the factors, based on prevailing field level situation, under above four dimensions. Study found that 'abundance of organic manure and water' was the most important strength factor (with a global priority score of 0.144); whereas 'comparatively lower productivity of organic crop' with global priority of 0.079; 'Significant promotion effort by govt and non govt agencies' (global priority score 0.096) and 'sustenance and enhancement of productivity in long run' (global priority score 0.082) was the most important weakness, opportunity and threat factor respectively.

**Keywords:** Organic farming, Uttarakhand, Strength, Weakness, Opportunity and Threat factors.

### Introduction

To feed the rapidly increasing population, India was forced to promote and practice high synthetic input dependent, green revolution style intensive agriculture until recent past. Though it was resulted in converting India into a food surplus nation from a deficient one, but the negative effects of intensive farming by introduction of exotic species, land clearing, vegetation fragmentation, habitat change and soil erosion has been one of the main causes of biodiversity decline which many regions of India is presently facing (Bengtsson *et al.*, 2005; Hole *et al.*, 2005) [2, 7]. On the other hand consumers are increasingly seeking environmentally safe, chemical residue free healthy foods, along with product traceability. The scale of population outburst that India presently experiencing along with increasing economic liberalization are exerting heavy pressure on India's land resources. Thus, the coupled effect of meeting food demand under limited arable area and toxin-free agricultural produce have become an important forcing factor for countries like ours to explore possibilities for opting 'conventional agriculture', the dominant farming approach promoted by most government and agribusiness groups throughout the world or 'organic agriculture' a holistic production management system which is supportive to environment, health and sustainability (Pandey and Singh, 2012) [11]. Organic farming system emphasis on the use of organic matter for enhancing soil properties, minimizing food chain associated health hazards and attaining closed nutrient cycles, the key factors for sustainable agriculture. It is also considered as only feasible alternative and interesting option for sustainable agriculture in developing countries because it offers a unique combination of low external inputs and technology, environmental conservation and input/output efficiency (Augustine *et al.*, 2013).

Agriculture is a minor land use in terms of spatial extent but is the backbone of local livelihoods in the Himalayan state, Uttarakhand. It also has a predominance of mostly traditional integrated crop livestock farming (Subrahmanyeswari and Chander, 2013) along with small and marginal farmers depending on rainfall. Despite population increase, the area under agricultural land use has not changed much over the past 30-40 years in Uttarakhand as a result of socio-cultural restraints as well as legal ban on conversion of notified forests since 1890s, policies of supplying a quota of food grains at subsidised price and promotion of off-

### Correspondence

**Saikat Maji**  
 Ph.D Scholar, Dairy Extension  
 Division, ICAR-NDRI,  
 Karnal, Haryana, India

farm economy since 1970s. Especially hilly regions of the state had a comparative edge over many other areas in producing organic products. A vast number of farmers practising organic farming and the state have a well developed structure for promoting organic farming as well as marketing of organic crop products that ensure premium price received by farmers. But the predominance of small holder farmers is also a source of potential challenge for organic farming especially due to certification difficulties, traceability problem and marketing difficulties. So, given the conceptual pros and cons this study provides an overview of strengths and weaknesses of organic farming as experienced by practising organic farmers, in the hilly region of Uttarakhand, the first and the only state in the country with elaborate organic farming policy framed in the year 2000.

### Research Methodology

The study was conducted in the hilly state of Uttarakhand among the farmers currently engaged in Organic farming. Data from a total of 240 farmers were gathered and analyzed spread across eight blocks of four district of the state namely; Haridwar, Udham Singh Nagar, Tehri and Pithoragarh. Prospect was analyzed in terms of Strength, weakness, opportunity and threat by utilizing analytical hierarchy process for quantitative visualization. It required comparing four dimension of prospect on a paired comparison basis in a nine point continuum to get the relative weightage of each dimension given the prevailing situation in Uttarakhand (Table 1). Later factors under each dimension were selected on the basis on experts' opinion and literature survey. Opinion of well informed farmers interacted during pre study surveying was also taken into consideration before initial inclusion of factors. These factors were subjected to scrutiny and their subsequent screening for inclusion in the final

schedule based on relevancy test. The relevancy weightage (RW) and mean relevancy score (MRS) were worked out for all the factors individually as well as overall mean relevancy score (OMRS) including all the factors was calculated. By these criteria the factors having relevancy weightage (RW) > 0.85 and mean relevancy score (MRS) greater than the overall mean relevancy score, were considered for inclusion in final analysis. Factors under each dimension were compared in a nine point continuum (Satty, 2008) [16]. Aggregation of Individual Priorities (AIP) was done using geometric mean (Wu, 2008) [22]. By taking the derived value from AIP method, comparison matrix was developed for the group of individuals. Consistency of priorities was checked by using consistency index (CI) which is related to the eigenvalue method. The Eigen value ( $\lambda_{max}$ ) was obtained by summing of products of each element of eigen vector multiplied by the total of columns of reciprocal matrix. Consistency index was calculated by the following formula

$$CI = \frac{(\lambda_{max} - n)}{(n - 1)} \text{ where, } n = \text{dimension of the matrix}$$

$\lambda_{max}$  = maximal eigenvalue

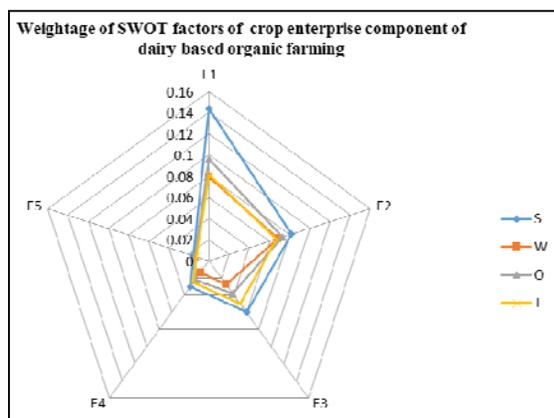
Consistency Ratio (CI/Random index) of less than 0.01 is the assurance of consistency among choices made by individual as well as all respondent among factors under each dimension. Various criteria had local priority (priority/ scaling factor within a particular factor) and global or overall priority (priority/ scaling factor in relation to overall goal). To get global priority of criteria to overall goal, priority vector of SWOT factors was multiplied with local priorities of respective criteria within the particular SWOT factor.

**Table 1:** Priority weights of four dimension of prospect of organic farming (Strength, Weakness, Opportunity and Threat)

Factors	Priority Weights	$\lambda_{max}$	Consistency index (CI)	Consistency ratio (CR)	Rank
Strength (S)	0.331	2.993	0.335	0.037	I
Weakness (W)	0.189				IV
Opportunity (O)	0.243				II
Threat (T)	0.237				III

### Result and Discussion

Prospect of organic farming in Uttarakhand was visualized through factors under four dimensions viz. strength, weakness, opportunity and threat which were based on prevailing field level situation experienced by practising organic farmers of the state as illustrated below. (Chart 1).



**Chart 1:** Overall priority weights of SWOT factors of organic farming in Uttarakhand, India

**Strength factors:** Based on the quantitative importance to the overall prospect of organic dairy farming among organic farmers, the most important factor under strength was “abundance of organic manure and water” with a global priority of 0.144 (Table 2). Uttarakhand is rich in forest cover (64% of total area), the primary source of traditional farmyard manure (leaf litter and 50-70% of livestock feed available from forests) and water resources (upper catchment of the snow-fed Ganga and >1000 mm annual rainfall), the key inputs for sustaining organic farming. Forest leaf litter is mostly used as bedding material in livestock sheds and courtyards and litter-livestock excreta mixture as farmyard manure (Pandey and Singh, 2012) [11]. “Community based certification system along with other support services” (global priority score 0.081) was second most important factor. The provision of community based certification system as followed by UOCB, the chief organic farming certification agency in the state, is proved to be beneficial especially for small and marginal farmers, who have predominance in the state (COF, 2009) [6]. The next factors based on importance was found to be “the rich indigenous knowledge base of local population” (score 0.060) and “self reliant-low cost-environment adaptive crop-livestock integrated farming”

(score 0.030). Uttarakhand is also known for its rich indigenous medicinal flora and *ayurvedic* medicine use tradition which serve not only for human health but also for treatment of animals. Majority of the traditional settled upland agriculture is organic by default because of problems of access to agrochemicals, poor crop response to chemical fertilizers in the widespread rainfed condition and fairly high crop yields as long as sufficient quantity of traditional farm yard manure with a C/N ratio close to 25 was applied, weeds were recycled, terraces were maintained and traditional labor-intensive but environment-adaptive cropping systems were practised. Villages, with mean land holdings of 1.7 ha, livestock holdings of 5 adult units, > 4 ha of dense forest area available for producing traditional farmyard manure/sustaining livestock and traditional diversified food

system, were food sufficient (Singh *et al.* 2008, Chandra *et al.* 2011, Bhadauria *et al.* 2012) [17, 5, 3] and thus provide ideal condition for converting into organic farming without incurring much hidden cost or efforts. “policies to promote preservation of rich mountain biodiversity and discouraging agrochemicals” with priority score of 0.015 was last factor among analyzed five in terms of importance. The policies in the state, which was announced as organic state at the very year of its formation, actively discouraged modern inputs. It had also escaped shifting cultivation with 3-4 years fallow periods, predominant in other Himalayan states (Ramakrishnan *et al.* 2006, Ramesh *et al.* 2010) [14]. Thus the state still maintained the natural biodiversity and natural resource purity from synthetic chemicals which provide the state’s farmers an upper hand for achieving the organic label.

**Table 2:** Strength factors in relation to prospect of organic farming in Uttarakhand

SWOT groups	Priority of the group (Scaling factor)	SWOT factors	Consistency ratio (CR)	Priority of the factors within SWOT group	Global or overall priority of the factor
Strengths (S)	0.331	S1: Abundance of organic manure and water	0.077	0.434	0.144
		S2: Provision of community based certification system along with other support services		0.246	0.081
		S3: Rich indigenous knowledge base of local population		0.181	0.060
		S4: Self-reliant-low cost-environment adaptive crop-livestock integrated farming		0.092	0.030
		S5: Policies to promote preservation of rich mountain biodiversity and discouraging agrochemicals		0.047	0.015
$\lambda_{\max} = 5.348$ CI= 0.087					

**Weakness Factors:** The most serious factor considered as weakness was “comparatively lower productivity of organic crop” with global priority of 0.079 (Table 3). Converting into organic system always coupled with loss of productivity of crops. It is because of forbiddance of using synthetic chemical inputs along with a numbers of other restrictions in terms of variety, irrigation and other practises. Organic farms yield on an average 10-15% less than conventional farms in its maturity level which may be more in the initial years of conversion (Lotter, 2003) [8]. “Unsatisfactory price premium for organic products” (score 0.069) and “inadequate supply of organic inputs and skilled labour” (score 0.027) was found to be next two important weakness factors. Given the predominance of subsistence farmers in the hills which often seemed very difficult to sustain for farmers till the achieve level of profitable production. Also the market base for organic products still at developing stage at domestic market. The international trade in organic products is often considered risky businesses due to existence of diseases, traceability problems as also self-sufficiency in importing countries. Only about 8% of the total organic produce is consumed by the

domestic market (Raste, 2004) [15]. The restriction applied on import of agricultural products from developing countries often due to political reasons is an important limiting factor given the limited demand and less price premium in domestic market (Maji *et al.*, 2017) [9]. Apart from this due to not widespread adoption and often difficult geographical condition of the state the critical input supply suffered thus in the process often compelled the farmers to pay comparatively higher price for inputs, to be collected from distant market. Thakur and Sharma (2005) [21] reported 95% organic farmers faced the problem of lack of marketing intelligence, lack of right marketing network, lack of regular supply, lack of availability of organic inputs like bio-fertilisers and bio-pesticides. Lastly “rigorous certification process and complex practices” (score 0.014) was found to be important weakness factor for Uttarakhand organic farmers. Organic certification as perceived by the farmers in the study area was quite complex, especially for small farmers. Certification primarily based on documentation, while most small farmers are illiterate and thus often remained unable to follow all the quality parameter involved.

**Table 3:** Weakness factors in relation to prospect of organic farming in Uttarakhand

SWOT groups	Priority of the group (Scaling factor)	SWOT factors	Consistency ratio (CR)	Priority of the factors within SWOT group	Global or overall priority of the factor
Weakness (W)	0.189	W1: Comparatively lower productivity of organic crop	0.091	0.419	0.079
		W2: Unsatisfactory price premium for organic products		0.3623	0.069
		W3: Inadequate supply of organic inputs and skilled labour along with higher labour cost		0.145	0.027
		W4: Rigorous certification process and complex practices		0.073	0.014
$\lambda_{\max} = 4.246$ CI= 0.082					

**Opportunity factors:** “Significant promotion effort by govt and non govt agencies” was perceived as the most important opportunity factor with a global priority index value of 0.096, followed by “willingness to pay for safe organic food in nearby cities” (score 0.073). Uttarakhand has a well developed organic farming policy from the very time of creation of the state which ultimately help not only to established a well developed government mechanism to promote organic farming spearheaded by UOCB (Uttarakhand Organic Commodity Board) but also in turns attracted a number of NGO and private companies to get involved in the overall network of organic farming. It is proved to be increasingly beneficial for not only present organic farmers but for future farmer who will converted into organic farming with lesser difficulty. Besides the environmental and economic concerns, growing market especially in cities is another important stimulant for organic farming in India (Prakash, 2003; Narayanan, 2005) <sup>[12, 10]</sup>. Bajwa (2003) <sup>[11]</sup> reported that more than 70% of the consumers with even incomes above Rs. 5,000 per month were ready to pay 15-20% premium for organic food in cities of Baroda and

Ahmedabad. Cities of Uttarakhand itself and neighbouring Delhi and Uttar Pradesh and Punjab also displayed similar trend presently. The next important opportunity factors were “traditional crop livestock based production system” (score 0.038), “abundance of abandoned cattle in UK” (0.022), and “scope for agricultural tourism in UK” (0.014). (Table 4) The majority of farmers in Uttarakhand operate mixed crop–livestock farming systems under different types of agro-ecosystems (Singh, 1998) <sup>[19]</sup>. This integration of various forms of crops and animals ensure input availability for both crop and dairy enterprise along with efficient recycling of by-products. It also offers synergistic interactions with a greater total contribution than the sum of their individual effects (Butterworth *et al.*, 2003) <sup>[4]</sup>. Lastly Uttarakhand as a famous tourist destination has an inherent potential to further promote agriculture tourism in form of holiday farm stay *etc.* which is increasingly used by some organic farmers to boost up their income at least at the primary stages of conversion their organic farming which also increased their product visibility to the tourist from various state.

**Table 4:** Opportunity factors in relation to prospect of organic farming in Uttarakhand

SWOT groups	Priority of the group (Scaling factor)	SWOT factors	Consistency ratio (CR)	Priority of the factors within SWOT group	Global or overall priority of the factor
Opportunity (O)	0.243	O1: Significant promotion effort by govt and non govt agencies	0.063	0.395	0.096
		O2: Willingness to pay for safe organic food in nearby cities		0.298	0.073
		O3: Traditional crop livestock based production system		0.157	0.038
		O4: Abundance of abandoned cattle in UK		0.090	0.022
		O5: Organic agricultural tourism in UK		0.057	0.014
$\lambda_{\max} = 5.280$ CI=0.070					

**Threat factors:** Concerns about “sustenance and enhancement of productivity in long run” was the most important threat perceived with a global priority score of 0.082 immediately followed by “lack of adoption among neighbouring farmers” (score 0.067). (Table 5) Conversion into organic farming has the inherent shortcoming of immediate production loss if compared with the green revolution style intensive farming. Though productivity recovered gradually but rate of increase in production is generally very slow. It also required careful management of natural resources along with successful crop-livestock integration to maintain the soil fertility, which often seems difficult with restriction of applying inorganic minerals as experienced by many farmers practising organic farming. On the other hand with lack of sufficient price premium every year and lack of subsidy for production loss farmers of the state, especially small and marginal ones felt incentive less for practising a risky and innovative farming. Thus neighbouring farmers are not switching into organic as often assumed as will be the trickledown effect of adoption of an innovation. It also made the maintenance of quality along with further strengthening of entire organic market chain increasingly

impossible. “Increase incidence of crop failure” (score 0.050), “sanction violation by registered farmers”(0.025) and “practice based certification system”(0.012) was found to be next three important threat factors as quantified based on farmers opinion which will have to overcome in future (Table 5). With increasing incidence of pest and disease infestation and natural calamities due to climate change in last couple of years, the incidence of crop failure becoming more common as reported by farmers which further pressing many farmers to leave organic farming if not farming at all. Often many farmers did not able to follow strict management criteria sometimes due to lack of proper knowledge and sometime due to concerns about production. Further, some of the practices being followed are no different from that in the conventional produce supply chains like standards, prices, and compliance conditions (Singh and George, 2010) <sup>[18]</sup>. It often resulted into compromising quality product which also stemmed from the practice based certification followed in India and resulted in reputation loss in export market and in most serious case refusal of entire product lot by foreign importers.

**Table 5:** Threat factors in relation to prospect of organic farming in Uttarakhand

SWOT groups	Priority of the group (Scaling factor)	SWOT factors	Consistency ratio (CR)	Priority of the factors within SWOT group	Global or overall priority of the factor
Threats (T)	0.236	T1: Sustenance and enhancement of productivity in long run	0.079	0.345	0.082
		T2: Lack of adoption among neighbouring farmers		0.282	0.067
		T3: Increase incidence of crop failure		0.211	0.050
		T4: Sanction violation by registered farmers		0.107	0.025
		T5: Practice based certification system		0.053	0.012
$\lambda_{\max} = 5.352$ CI=0.088					

### Conclusion

Organic farming has a strong potential not only in Uttarakhand but also in various regions of India especially those which are relatively less intervened by high external input dependent intensive in-organic farming. With rich indigenous knowledge, rich biodiversity, lower cost of production of organic farming and with still unexplored vast domestic market conversion to organic production looks like a lucrative option for not only certified organic and other traditional farmers of Uttarakhand but also farmers throughout India. But given its stringent standard requirement as well as lack of infrastructural and financial support it's hard to be adopted on a mass scale in short time. If supported by successive capacity and knowledge building and promotion of organic products to increase consumers' awareness of organic products, along with strong policy measures for promotion and certification by government by shedding the past dilemma, Uttarakhand in particular and India in general will be able to take a lead in the world of organic movement.

### References

- Bajwa MS. Organic Farming: A High Value Enterprise, The Tribune, Agriculture Tribune, Chandigarh, 2003.
- Bengtsson J, Ahnstrom J, Weibull AC. The effects of organic agriculture on biodiversity and abundance: a meta analysis. *Journal of App. Ecology*. 2005; 42(1):261-269.
- Bhadauria T, Kumar P, Kumar R, Maikhuri RK, Saxena KG. Earthworm populations in a traditional village landscape in Central Himalaya, India. *Applied Soil Ecology*. 2012; 53:83-93.
- Butterworth J, Adolph B, Reddy BS. How Farmers Manage Soil Fertility? A Guide to Support Innovation and Livelihoods. Andhra Pradesh Rural Livelihoods Programme, Hyderabad, Natural Resources Institute, UK. 2003.
- Chandra A, Pardha Saradhi, P Rao KS, Saxena KG, Maikhuri RK. An investigation into the energy use in relation to yield of traditional crops in central Himalaya, India *Biomass and Bioenergy*. 2011; 35: 2044-2052.
- COF. Impact Assessment study of Center of Organic Farming I & II, Uttarakhand state. Sir Ratan Tata Trust, Bombay House, Mumbai. December, 2009.
- Hole DG, Perkins AJ, Wilson JD, Alexander IH, Grice PV, Evans AD. Does organic farming benefit biodiversity? *Biological Conservation*. 2005; 122:113-130.
- Lotter D. Organic Agriculture. *J. of Sustain. Agric*. 2003; 21:1-63.
- Maji S, Meena BS, Paul P, Rudroju V. Prospect of organic dairy farming in India: A review. *Asian Journal of Dairy and Food Research*. 2017; 36(01):1-8.
- Narayanan S. Organic Farming in India: Relevance, Problems and Constraints. Department of Economic Analysis and Research (DEAR), Occasional Paper No. 38, National Bank for Agriculture and Rural Development (NABARD), Mumbai, 2005.
- Pandey J, Singh A. Opportunities and constraints in organic farming: an Indian perspective. *Journal of Scientific Research*. 2012; 56:47-72.
- Prakash TN. A theoretical framework to promote organic produce marketing in India, *Indian Journal of Agricultural Marketing*. 2003; 17(3):1-16.
- Ramakrishnan PS, Saxena KG, Rao KS. Shifting Agriculture and Sustainable Development of North-Eastern India: Tradition in Transition. Oxford and IBH Publishing, New Delhi, India, 495.
- Ramesh P, Panwar NR, Singh AB, Ramana S, Yadav SK, Shrivastava R *et al*. Status of organic farming in India. *Current Science*. 2010; 98:1190-1194.
- Raste A. The ECL Space Project- Learning from Social and Environmental Schemes for the ECL Space- IFOAM Case Study, Pi Environmental Consulting, October, 2004.
- Saaty TL. Decision making with the analytic hierarchy process. *International Journal Services Sciences*. 2008; 1(1):83- 98.
- Singh K, Maikhuri RK, Rao KS, Saxena KG. Characterizing land-use diversity in village landscapes for sustainable mountain development: a case study from Indian Himalaya. *Environmentalist*. 2008; 28:429-445.
- Singh S, George R. Awareness and beliefs of farmers in Uttarakhand, India. *J. Hum. Ecol*. 2010; 37(2):139-149.
- Singh V. Traditional biodiversity management strategies in the mountains: farmers' experimentation in Garhwal Himalaya. In *Mountain Ecosystems: A Scenario of Unsustainability* (eds Singh, V. and Sharma, M. L.), Indus Publishing House, New Delhi, 1998, 25-66.
- Subrahmanyeswari B, Chander M. Livestock production practices of registered organic farmers in Uttarakhand state of India. 16<sup>th</sup> IFOAM organic world congress, Modena, Italy. Retrieved from <http://orgprints.org/view/projects/conference.html>, 2008.
- Thakur DS, Sharma KD. Organic farming for sustainable agriculture and meeting the challenges of food security in 21st century, *Indian Journal of Agricultural Economics*. 2005; 60(2):205-219.
- Wu CR, Chang CW, Lin HL. Comparing the aggregation methods in the analytic hierarchy process when uniform distribution. *Wseas Transactions on Business and Economics*. 2008; 5(3):82-87.