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From Farmers to Entrepreneurs—Strengthening Malta Orange Value Chains Through Institutional Development in Uttarakhand, India

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Malta orange (Citrus sinensis) *is an important cash crop in the mountain state of Uttarakhand, India. Smallholder farmers growing it face multiple challenges due to unorganized and inaccessible markets; they are forced to sell to intermediaries at very low prices. In response, the government of Uttarakhand introduced a minimum support price for Malta oranges; however, this failed to address farmers' problems due to poor implementation. This paper presents the results of an action research project with farmers in the Chamoli district of Uttarakhand to develop farmers' resilience by upgrading their position in the Malta orange value chain, targeting production, processing, and marketing through community-based enterprise development. Information was collected before and after the intervention by various means, including stakeholder meetings, focus group discussions, and interviews with farmers and value chain facilitators. Activities supported by the research have contributed to increased productivity and farmer incomes. Farmers became better organized, and their bargaining power improved considerably. The enterprise-based upgrading process brought about an inclusive and pro-poor Malta orange value chain system with improved terms of engagement for smallholder farmers. The research results show that policy change, improved provision of technical and financial services, establishment of common facility centers, and strengthening of farmers' institutions are imperative to enable smallholder farmers to engage in value chains and thus increase their resilience.*

Keywords: *Community-based enterprise; value chain; income; employment;* Citrus sinensis*; action research; Uttarakhand.*

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Mountain farmers' marketing challenges

Globalization is exposing farmers to new and unfamiliar conditions. Although some farmers may be in a position to take advantage of these changes, many more, particularly in the developing world, are facing increased vulnerability (Leichenko and O'Brien 2002). To deal with increased instability and competition, smallholder farmers need to enhance their competitiveness (Best et al 2005). A large body of literature has highlighted the problems of smallholder farmers (Pingali 1997; Lado 1998; Key and Runsten 1999; Kaplinsky 2000; O'Brien and Leichenko 2000; O'Brien et al 2004; Bardhan 2006; Pingali 2007; Giel 2008; Barham and Chitemi 2009; Deressa et al 2009; Shiferaw et al 2009; Bolwig et al 2010; Mitchell et al 2011; Kohler and Romeo 2013).

The problem is more acute in mountain areas, particularly in the Hindu Kush–Himalayan region (Jodha 2000, 2005; Schild 2007). Mountain famers face a host of challenges in marketing their agricultural products due to remoteness, poor physical and economic infrastructure, high transport costs, low volume, inadequate information, poor access to credit and other institutional services, and weak bargaining power (Pandey et al 2011; Choudhary et al 2012a; Hurni 2013). The perishable nature of agricultural products and the lack of storage and processing facilities further aggravate the marketing problems (Sanginga et al 2004; Pokhrel and Thapa 2007; Tiwari et al 2008; Shahbaz et al 2010).

The opportunity for smallholder farmers to raise their incomes depends on their ability to compete in the markets (Hazell 2005; Shepherd 2007; Markelova et al 2009). This is constrained by high transaction costs and coordination problems along the production-to-consumption value chain (Shiferaw et al 2008). Asymmetrical power relations in agro-food value chains have been highlighted by Bolwig et al (2010) and Ponte (2009). The paucity of effective farmer organizations, producer associations, and trade associations is seen as a major obstacle to commercialization in mountain regions

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(Choudhary and Banskota 2009). Collective action is the key to overcoming the shortcomings of unreliable and low production and enhancing producers' negotiating power in the value chain (Wymann von Dach 2013). Smallholder farmers can reduce transaction costs, obtain necessary market information, secure access to new technologies and options, and improve market access by acting collectively (Barham and Chitemi 2009; Gruere et al 2009; Kruijssen et al 2009; Markelova et al 2009; Poulton and Lyne 2009). To meet these conditions, farmers need to become organized and to strengthen internal and external relations with group members, service providers, and market chain actors.

Malta orange: an important but underdeveloped cash crop

Malta orange (*Citrus sinensis*) is an important cash crop in the mountain state of Uttarakhand in the western Indian Himalayas (Pandey et al 2011). Ninety percent of the state is made up of high mountains and deep valleys. The average landholding in the hills is 0.82 ha, with only 19% of the land under irrigation. The agricultural sector is one of the main sources of livelihood for 65–78% of the population. It has grown by only 2.4% a year over the past decade (GIZ and Doon University 2011).

Malta oranges were introduced and promoted by the state horticulture and watershed departments under a program for horticulture development in hill districts (Choudhary et al 2013). They are grown largely on family farms at elevations between 900 and 2200 masl and are harvested in November and December. The crop is mainly marketed as a substitute for *mousambi* (sweet lime) (*Citrus limetta*) and has not been able to create its own identity in the market. Malta oranges face strong competition from other citrus fruits like oranges produced in western India. Their sour taste and thick skin reduce their attraction to consumers and their potential for commercialization as fresh fruit.

Malta orange farmers in Uttarakhand face the same problems in marketing their products as other mountain farmers (Pandey et al 2011; Choudhary et al 2012a). The return has become so low that in recent years some farmers have stopped taking care of their orchards and have even cut down the trees. There is poor institutional support in terms of credit, insurance, and buffers for price fluctuations. Malta farmers generally receive less than one tenth of the price paid by consumers (Pandey et al 2011). In the absence of other horticulture cash crops, however, many farmers have continued to grow Malta oranges as they still receive some cash income in the off season (when there are few other agricultural products) by selling to local traders at low prices.

Policy response

The government of Uttarakhand responded to these problems in 1999 by introducing a minimum support price to growers of Malta oranges to guarantee farmers' income, with the Garhwal Mandal Vikas Nigam, a government agency designated to facilitate marketing and purchase of Malta oranges from farmers at this price (Choudhary et al 2013). Although a positive step, in practice the initiative has not addressed the needs of smallholder farmers for 2 main reasons: (1) The annual announcements of the minimum support price and procedures for procurement are made late, when most farmers have already sold their produce, and (2) Garhwal Mandal Vikas Nigam payments to farmers are often delayed by as long as 5 to 6 months after purchase, whereas farmers need rapid cash payment, especially as the credit markets are inadequate. Thus, smallholder farmers are forced to sell the crop to local traders, who pay much lower prices. The minimum support price policy has not helped to harness the potential for Malta oranges to improve income and employment for mountain people with small family farms. These constraints led us to choose Malta oranges as an action research topic.

Addressing the challenges of Malta orange farmers

The action research initiative was implemented by the International Centre for Integrated Mountain Development (ICIMOD)—a regional knowledge center—and Himalayan Action Research Centre (HARC)—a nongovernment organization (NGO). The initiative addressed the problems faced by Malta orange farmers in Uttarakhand using a value chain approach. This approach offers a diagnostic and operational tool for assessing marketing system performance; identifying the structure of rewards, the functional division of labor along a chain, and key bottlenecks; and coordinating private and public interventions aimed at improving performance (Morrison et al 2008; Chitundu et al 2009; Bolwig et al 2010). In value chain analysis, the concept of upgrading is used to identify possibilities for producers to "move up the value chain" by shifting to more rewarding functional positions, making products with more value-added invested in them, and/or achieving better returns (Bolwig et al 2010). Mitchell et al (2011) showed how the size and capacities of entrepreneurs and the dynamic internal and external governance structures affect their upgrading options. In essence, upgrading is about acquiring capabilities and accessing new market segments through participation in particular chains (Ponte 2008).

Action research was used because it takes place in a real-world situation and aims to solve specific problems with the involvement of the target group and stakeholders as coresearchers, on the assumption that people learn best and apply their knowledge more willingly through active participation (Devaux et al 2009; Kaganzi et al 2009; Riisgaard et al 2010; Fischer and Qaim 2012). The initiative focused on mobilizing and organizing growers

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of Malta oranges in Chamoli district and developing processing facilities to improve the market for them (Choudhary et al 2013). This paper presents the findings of the study and discusses their relevance for developing income and employment opportunities for smallholder family farmers in the Himalayan region.

Combining value chain development and action research

The action research was carried out between January 2008 and June 2010. Its principal framework was derived from the value chain approach and used the methodology developed by Riisgaard et al (2010), which integrates economic, environmental, and social factors in the value chain analysis, while emphasizing strategic and political approaches to achieving sustained improvements for disadvantaged groups.

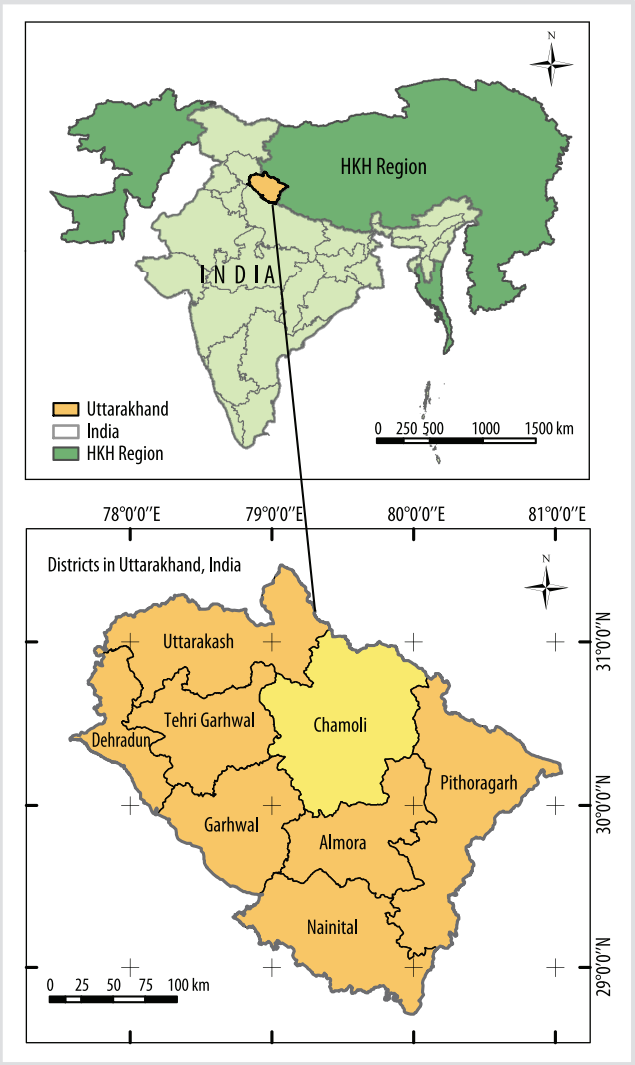
ICIMOD provided conceptual and methodological support to the design of the action research and the conduct of assessments and analysis together with the stakeholders. HARC implemented the activities with the target groups, conducted market research, trained farmers, established local institutions, and liaised with private and public research agencies and service providers. Farmers participated in the action research process by organizing themselves into groups, participating in trainings, implementing technical guidelines on production and processing, and providing feedback on their experiences. The state Horticulture Department and research centers provided technical and policy support. The activities were undertaken in an integrated manner based on situation assessments.

The action research strategy and criteria for site selection were developed in consultation with key stakeholders from the state Horticulture Department, district administration, farmers, traders, and HARC at a meeting in February 2008. The criteria identified for site selection were Malta orange cultivation, presence of support institutions such as NGOs, willingness of farmers, and road access. Based on this, the Ghat block in Chamoli district in northeastern Uttarakhand (latitude 30.22°N, longitude 79.44°E) was selected (Figure 1). It is located at an altitude between 1200 and 2400 m. Subsistence farming is the major occupation. The region faces significant outmigration of men due to the lack of local income-generation and employment opportunities, and remittances to the region are high (Choudhary et al 2013).

Research and implementation steps

First, based on an analysis of baseline data, the constraints on the Malta orange value chain, potential upgrading strategies, and actions to be undertaken were discussed in detail with 20 lead farmers and representatives of HARC. Important activities that the groups prioritized were documented. Stakeholders agreed that an innovative and multipronged strategy, commercializing both raw oranges and value-added products, was imperative to upgrade the value chain.

FIGURE 1 Location of the project area in northeastern Uttarakhand, India. (Map by Gauri Dangol, ICIMOD)



Second, the detailed upgrading strategy was discussed with the farmers at meetings in their villages and revised (Table 1). In the process, farmers were made aware that the strategy involved a shift from individual engagement to collective action.

Third, based on the interest shown by farmers in participating in the action research, 9 women's farmer interest groups with a total of 306 members were formed in Ghat. Women-only groups were formed because women were the ones mainly involved in the management of Malta orange trees and formed a large part of the resident population in the villages. They were linked in a federation in order to develop local institutional mechanisms to strengthen the coordination role of farmers as a group in the upstream value chain functions.

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TABLE 1 Strategies for upgrading the Malta orange value chain.

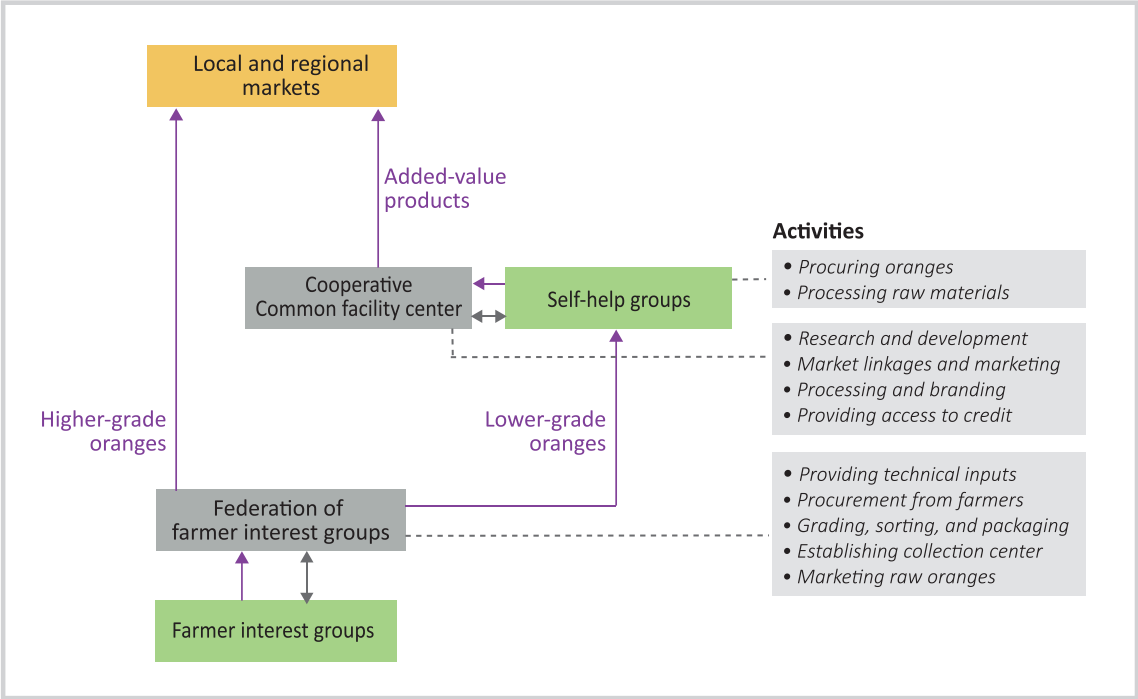
Issue	Constraints	Strategy	Actions	Actors
Unorganized producers	• Low prices • Unorganized marketing • Poor upstream value chain coordination	*Horizontal coordination:* activities aimed at improving collective action	Organizing farmers' group	HARC
			Establishing producers' cooperative	HARC
			Improving coordination of harvest and postharvest operations	ICIMOD, HARC, women's farmer interest group
Lack of product development strategies	• Low productivity • Lack of market recognition of Malta orange • Dependence on local and village traders	*Functional upgrading:* adding new activities for higher returns	Improving tree and orchard management	Horticulture Department, scientists, women's farmer interest group
			Developing value-added products in common facility center	ICIMOD, food processing experts, HARC
			Improving marketing strategies for raw and value-added products	ICIMOD, HARC
Low capacity to integrate upgraded value chain	Lack of production, processing, and marketing knowledge	*Process upgrading:* more efficient transformation of inputs into outputs	Building farmers' capacity	HARC
			Improving crop management	Women's farmer interest groups, HARC
Weak policy implementation	Lack of strategy for developing Malta oranges	*Value chain coordination upgrading:* policy readjustments, coordination among line agencies and stakeholders involved in value chain development	Promoting Malta orange value chain in collaboration with different state agencies	HARC, ICIMOD
			Advocating for a minimum support price policy	HARC
Lack of product commercialization	Lack of utilization of other local niche products	*Interchain upgrading:* applying new competences acquired in a different sector or value chain	Introducing other cultivated and wild products for commercialization by producers' cooperative	ICIMOD, HARC, women's farmer interest groups

Their main tasks were to promote the improved management of Malta orange trees and coordinate the production and selling of Malta oranges (Figure 2).

Fourth, a cooperative, the HARC Alaknanda Krishi Vyawasaya Swayatt Sahakarita, was formed to promote value addition, branding, and marketing and to manage a common facility center that was established by HARC together with the state government. A common facility center is an institutional arrangement that provides infrastructure and equipment to farmers and their groups to add value to their produce against a fee. In addition, HARC facilitated self-help groups (SHGs) of women from nearby villages with the aim to prepare business plans for processing Malta oranges and accessing bank financing. The SHGs invested their savings in procuring fresh Malta oranges from the women's farmer interest groups and

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FIGURE 2 Improved horizontal and vertical coordination of the Malta orange value chain in 2010 through farmers' institutions.



adding value to the products in the common facility center. The SHGs were members of the cooperative, which facilitated links with markets and service providers for a small fee. These interventions were designed as part of the collective action strategy to empower farmers to become entrepreneurs.

Fifth, the state Horticulture Department, research centers in the neighboring state of Himachal Pradesh, HARC, and technical experts from the private sector provided trainings on subjects such as orchard management, bookkeeping, group dynamics, conflict management, savings and credit management, and collective marketing.

Five processed product lines identified during the research were developed, prepared by the SHGs, and marketed by the cooperative under the brand name Switch On. The findings from the action research were regularly shared with the Horticulture Department for policy advocacy.

Baseline assessment and monitoring

Of 503 households living in the 13 villages of the Ghat block, 306 grew Malta oranges. Of these, 65% or 200 households were selected at random from all villages for data collection. Baseline information on Malta orange management, including tree and orchard management, production, primary processing, training, markets, and income was collected in face-to-face interviews with adult household members in September 2008 using a close-ended questionnaire. The Malta orange value chain was mapped and analyzed to understand the production, market, policy, and institutional barriers that prevented smallholder farmers from benefiting equitably from this crop.

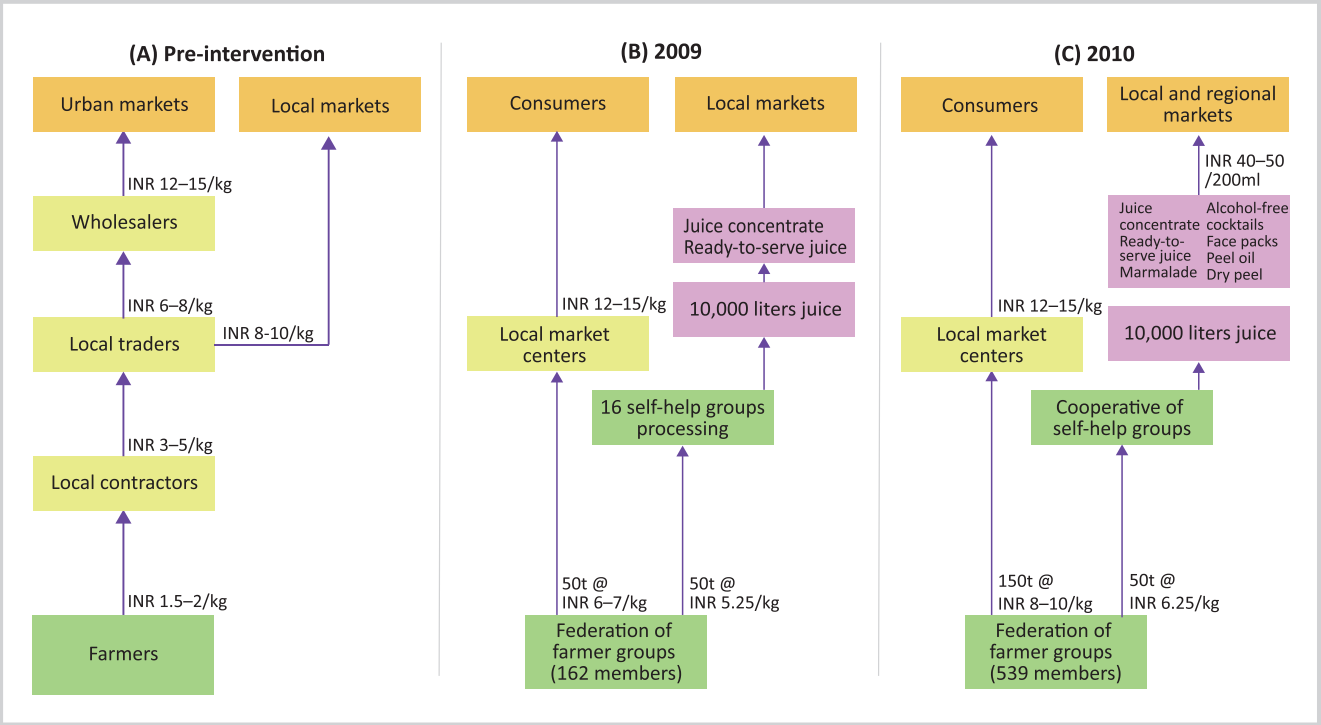
After the implementation of the upgrading activities, the same household respondents were interviewed to assess the activities' impacts, especially on income and management practices. The original questionnaire was modified to include 5 factors that had the potential to influence incomes: farmer's group formation, processing in a common facility center, improved primary processing, improved market access, and training. Information on the adoption of management practices was validated by the observations of members of HARC. An additional 30 women were selected at random from the self-help groups to collect information on income from processing of Malta oranges in the common facility center. The postintervention interviews were held in April 2010.

Data were analyzed using SPSS version 16. The *t*-test was used to ascertain if there was a significant postintervention increase in yield and incomes from producing and processing Malta oranges. The proportion test was used to analyze the change in farmers' awareness of orchard management, skills, and engagement in Malta orange orchard management.

The views of farmers on the benefits of trainings with 5 outcomes were measured on a ranking scale of 1–5 ranging from most important to least important. The five outcomes were given, and they were asked to rank them in terms of their importance. The scaling technique was also

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FIGURE 3 The Malta orange value chain: (A) before upgrading; and (B, C) after upgrading.



used for measuring the general level of perception of farmers with regard to the benefits from training.

Correlation was used to compare production and income pre- and postintervention and to analyze the factors influencing any changes in farmers' income.

Outcomes of the action research

Pre-intervention value chain

Most of the interviewed households had cultivated Malta oranges for the past 30 years. They had an average holding of 15 trees per household, and approximately 73% of the trees had reached the fruiting stage. Average annual production of the 306 grower households was 485 tonnes. The Malta orange value chain was observed to be unorganized and underdeveloped, unlike the value chains for cash crops and fruit from other parts of the state. The actors in the Malta orange value chain were categorized into 3 main types according to their function: primary producers, traders and wholesalers, and consumers.

Out of the 485 tonnes of Malta oranges, 436 tonnes were sold annually to local contractors for INR 1.5–2.0/kg (total value INR 759,500 or approximately US$ 16,877; 1 US$ = 45 INR in 2010), or sometimes exchanged for other commodities (Figure 3A). The price paid was much lower than the minimum support price set by the state government of INR 5.5/kg. The local contractors sold to local traders for INR 3–5/kg, and they in turn sold to wholesalers based in *mandies* (market centers where produce is auctioned) at INR 6–8/kg or sometimes at district markets for INR 8–10/kg. Local traders book the orchards in advance, and payments are made after they sell the fruit in the downstream markets. The wholesalers sell the Malta oranges in the plains as a substitute for *mousambi* (sweet lime) for INR 12–15/kg. No local institutional arrangements, orchard management activities, or value addition were reported by the farmers.

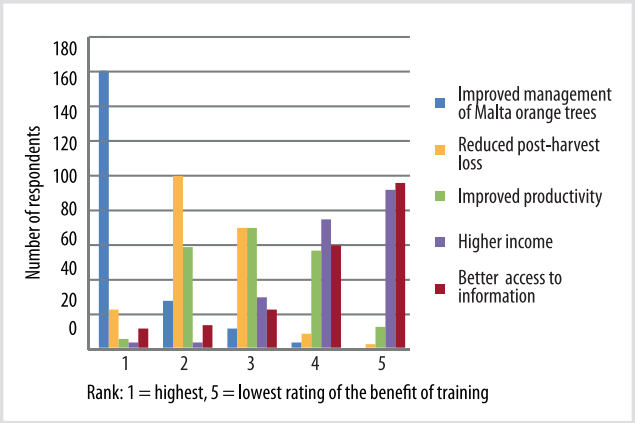
Upgraded Malta Orange value chain

The community-based intervention approach addressed the weaknesses and challenges of this value chain through a multipronged upgrading strategy to promote sustainable management of the Malta orange orchards, marketing, and processing, with the aim of increasing the farmers' value share from the value chain. The outcomes of some of the most important strategic activities, based on the stakeholders' assessment, are presented below.

Coordination of upstream value chain: The interventions led to improved coordination of the upstream production, processing, and marketing of Malta oranges through farmers' institutions. The women's farmer interest groups facilitated procurement and collective sale of Malta oranges, while the cooperative channeled them for value addition and marketing. Unlike before the intervention, the farmers and their federation and cooperative are now key actors in the value chain, and traders and wholesalers no longer reduce their benefits.

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FIGURE 4 Respondents' ranking of the benefits of the training.



In 2009, after the upgrading, the women's farmer interest groups from Ghat sold 50 tonnes of Malta oranges to the SHGs for processing at the common facility center at the minimum support price of INR 5.25 and 50 tonnes in the local market centers at INR 6–7/kg (Figure 3B). Later in the same year, the government increased the minimum support price for Malta oranges to INR 6.25/kg.

In 2010, following successful results in 2009, farmers formed an additional 14 interest groups with 97 households from the Ghat block and 136 households from the adjoining Gairsain block, under the umbrella of the action research, bringing the total number of participating households to 539 (Figure 3C). They again sold 50 tonnes of low-grade Malta oranges to the cooperative, at the revised minimum support price of INR 6.25/kg, and a further 150 tonnes of fruit in the local market centers at INR 8–10/kg.

Training: The responses from the interviewed households showed that training on Malta orange orchard management, and adoption of the improved management practices by farmers, led to increased production. Improvements were observed in terms of size, taste, and color of the fruit as well as yield. The training served as a trigger for positive changes in different aspects of Malta orange production and management. Farmers identified 5 main benefits of training (Figure 4), with the most important being improved management of Malta orange trees, followed by reduced postharvest losses, improved productivity, higher income, and better access to information. Before the intervention, 189 out of the 200 interviewed farmers were not aware of improved Malta orange orchard management practices. More than 95% of the farmers confirmed that their skills related to orchard management had increased as a result of the intervention.

Income from Malta oranges: Farmers received higher prices for their products after the interventions: Analysis showed that the average income from Malta oranges almost tripled (t-test statistic -2.91; p value < 0.005). The logistic model showed that the increase in income resulted mainly from institutional development, in the form of farmer interest groups and the federation, and training, followed by establishment of the common facility center (Table 2).

The cooperative, through its SHG members, produced and sold 1 fresh and 5 processed, value-added products made from Malta oranges: ready-to-serve juice, juice for storage, juice concentrate, marmalade, peel powder, and peel oil. Table 3 shows the income from value-added products for SHG members. Women's income and employment opportunities increased substantially from Malta orange processing.

New products like *amla* (Indian gooseberry), mango, *tulsi* (holy basil), ginger, garlic, and chili were subsequently introduced for processing into pickles, juice concentrate, and candies by the SHGs (Table 4) to enable year-round operation and the sustainability of the cooperative.

Relevance of the outcomes

Mountain farmers face challenges in linking to markets and ensuring profitability from production (Negi et al 2006; Stringer et al 2008). By focusing on upstream–downstream linkages and analyzing the underlying governance of value chains of high-value products, producers from remote production areas can be linked with urban and regional markets (Choudhary et al 2014). Diverse strategies, including different forms of value chain coordination, with appropriate external support, are essential for smallholder farmers (Choudhary et al 2012b, 2013). The action research described here was an attempt to outline an innovative, comprehensive, but also

TABLE 2 Factors contributing to the increase in farmers' incomes.

Independent variables and constant	Coefficient	Standard error	Wald statistic
Formation of groups	20.595	2827.67	0.00
Training	21.052	2563.37	0.00
Establishment of the common facility center	3.332	1.13	8.76
Constant	−3.689	1.01	13.28

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TABLE 3 Average annual income from Malta orange products in Indian rupees in 2010.

Product	Before interventions (INR)	After interventions (INR)	*t* value	*p* value
Ready-to-serve juice	0	2,357	−19.66	0.000*
Juice for storage	472	2,847	−25.81	0.000*
Juice concentrate	270	5,173	−26.09	0.000*
Marmalade	0	2,850	−33.09	0.000*
Peel powder	0	41	−2.71	0.011*
Peel oil	0	19	−2.96	0.006*
Other products at the common facility center	234	1,205	−30.53	0.000*
Total	**976**	**14,492**	**−52.66**	**0.000***

*Significant at $p = 0.00$.

demanding value chain approach combining collective action with provision of technical support services that enabled Malta orange farmers to improve market access and livelihoods and adopt an entrepreneurial approach. The action research in value chains enabled farmers to increase benefits and reduce risks by developing institutional mechanisms for improving their terms of engagement in the value chain upgrading process. Farmers were helped to promote diverse local products in addition to Malta oranges in a process that empowered farmers, especially women. The project demonstrated the need to harness economies of scale for small farms to improve livelihoods in mountain regions.

The combination of seasonal gluts and an unorganized and imperfect market system means that Malta orange growers scattered across the hill areas have little bargaining power and are generally forced to sell to intermediaries at a very low price (Pandey et al 2011). The intervention described here led to a number of benefits, including increased productivity, negotiating power, and income. Institutional development played a major role. The women's farmer interest groups practiced improved orchard management and had an incentive to devote more time and resources to improving productivity; the bargaining power and capacity of the umbrella federation facilitated marketing and the ability to command an appropriate sale price; and the cooperative and self-help groups facilitated development, processing, and sale of processed products (Figure 5). Our findings corroborate those of previous studies (eg Giel 2008; Barham and Chitemi 2009) that show collective action improves smallholders' market access and gains.

Overall, the improved upstream coordination—which resulted from enterprise development, access to services, and information and capacity development—reduced transaction costs and encouraged increased farmer participation in the Malta orange value chain. Quick gains for farmers from the interventions were a major trigger of success. This increased farmers' confidence in the value chain upgrading approach and improved their capacity to

TABLE 4 Local value-added products promoted by the cooperative in 2010.

Crop	Season(s)	Product	Person days (employment in value-addition activities)	Total revenue (INR)
Amla fruit	October–December	Candy, pickles, juice concentrate	200	50,000
Green chili	August–November	Pickles	100	20,000
Tulsi (holy basil)	July–September September–December	Tea, dry leaves	300	50,000
Rhododendron	February–March	Juice, juice concentrate	100	60,000
Mango	June–August	Pickles	80	40,000

Source: Field survey 2010.

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FIGURE 5 A member of a self-help group labels a value-added product in the common facility center. (Photo by Mahendra Singh Kunwar)



innovate and take charge of upstream activities. The process also developed trust among stakeholders.

The concepts of "horizontal and vertical contractualization" (Riisgaard et al 2010) can help to explain the success of this action research. "Horizontal contractualization" leads to better coordination among producers in aggregating products, maintaining quality standards, accessing inputs, and improving bargaining power. The popularity of the approach was shown in the development by farmers of 14 additional interest groups in the second year, including a large number from the neighboring block. Many more farmers from Chamoli district and beyond asked if they could bring their produce to be processed or marketed by the common facility center. They could not be accommodated, as the center's capacity was limited, but the requests show a clear need for significant scaling up. Collective action combined with strong leadership and an iterative market-led learning process can enable smallholder farmers to improve marketing (Kaganzi et al 2009).

"Vertical contractualization" leads to better integration and relationships with traders and sellers. Institutional arrangements on the interface between vertical and horizontal coordination in food chains need to be promoted to effectively use postharvest technologies (Giel 2008).

One of the greatest gains was the increase in perceived value of Malta oranges that resulted from the local processing. The local value addition helped to offset the poor positioning of Malta oranges in the markets and to generate a comparative advantage, as well as to provide higher incomes and employment. This was possible as the farmers adopted an enterprise-driven approach to managing their Malta oranges. The capacity for processing at the common facility center was limited to 50 tonnes, but the potential to increase this, both locally and on a broad scale, is considerable. Capacity development plays a key role in enabling such a shift from individual to collective action (Choudhary et al 2012b). Farmers have acknowledged the benefits of training to achieve this shift.

Value chain analysis provides valuable insights into policy formulation and implementation (Kaplinsky 2000; Mitchell et al 2011). The project not only benefited the farmers in the interest groups and self-help groups, it also had a positive impact beyond by increasing the sale price. The government realized the potential of Malta oranges and increased the minimum support price for all farmers in the state. Evidence indicates that farmers also received higher prices than previously from local contractors. This benefited farmers participating in the action research (who were still selling a large part of their production to local traders) as well as those not in the project. In the 2013 season, the overall turnover of the cooperative from Malta orange and other value-added products was US$ 23,429, compared to US$ 9200 in 2009 (HARC Alaknanda Krishi Vyawasaya Swayatt Sahakarita Record 2014).

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Beyond prices, farmer groups function as important catalysts for innovation adoption by promoting efficient information flows (Fischer and Qaim 2012). The processing of other local products using the capacity generated during the action research further supports the shift in farmers' practices toward an entrepreneurial approach. With technical support from HARC, the cooperative has developed capacity to manage the operations of the enterprise and is paying for external expertise and overhead costs from the revenue generated. These results indicate that farmers have successfully adopted the enterprise approach, the process is sustaining, and income from the Malta orange value chain is reliable in the long run. New donors and government programs have pledged support to further increase the outreach of the enterprise to benefit many mountain farmers in remote areas (personal communication, cooperative member, 15 July 2014).

The business-as-usual process of mountain regions exporting raw products to downstream markets at low prices was thus changed to demonstrate an integrated model that improved value chain governance in favor of the farmers. Value addition and marketing through rural producer organizations can be a way to overcome the problems faced by smallholder farmers (Bienabe and Sautier 2005). The value chain development that was promoted through local institutions with support services increased the resilience of farmers and processors and improved their terms of engagement in the value chain. Institutional innovations that strengthen producer organizations and promote collective marketing groups can help remedy pervasive market failures in rural economies (Shiferaw et al 2009). The approach is providing sustainable employment opportunities for women, which is particularly important in view of the increasing outmigration of men. This approach could be used for other high-value products produced on family farms in the Himalayan region to increase income and employment opportunities. It may be unrealistic to expect smallholder farmers and their enterprises to be competitive in markets without external facilitation and substantial investment in quality and performance (Ponte 2008).

Conclusion and recommendations

The findings of the action research show improved productivity, value addition, income, and employment generation from integrated community-based value chain development. Lessons learned from the research suggest that, in order to enable mountain farmers to capture greater value from value chains, a two-pronged approach is needed: first, to adopt diversified upgrading strategies at different levels in the value chain with the provision of technical and financial support services, and second, to ensure institution building and strengthening to shift value chain governance in favor of smallholder farmers to reduce their risks and vulnerabilities. The following steps are recommended:

- Focus on processing with quality-assurance systems to produce diversified value-added products, and explore strategies to link producers with diverse end users. Links with national and international research and development agencies should also be explored.
- Include employment generation from value addition to mountain products under horticulture, rural development, and poverty reduction policies and programs such as the National Horticulture Mission and Mahatma Gandhi National Rural Employment Guarantee Act to retain greater value share for smallholder farmers in mountain regions and increase their incomes.
- Establish common facility centers to provide forward and backward linkages for smallholder farmers to engage in value chains.
- Establish marketing centers such as *mandies* (auction facilities) closer to production sites within mountain regions for access and equitable participation by smallholder farmers in markets; extend the minimum support prices to cover other niche mountain products.
- Ensure sustainability of the interventions by building strong and inclusive local institutions that are supported by competent local agencies from the beginning. Action research can demonstrate sustainable models when stakeholders who are engaged in local livelihoods development—such as district rural development agencies, the Department of Horticulture, universities and other research agencies, and farmers—work on demand-driven issues that create equitable benefits among the actors—a win–win situation. This helps to make the most of the often high transaction costs that are involved in establishing such collective mechanisms.
- Ensure that relevant agencies cooperate and create an environment that provides technical and policy support to promote pro-poor and community-based enterprise development. This is the only way that upscaling and replication of the lessons learned will be possible. Often in mountain regions, with the absence of the private sector in value addition of high-value mountain products, NGOs play an important facilitating role in value chain development. Although the process can be quite demanding, time-consuming, and costly, the action research strategy can be replicated across a wider area, to benefit mountain farmers, especially women, only if such a multiple-stakeholder-based innovation process is adopted.

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