# INNOVATIONS IN APPLE FARMING: A STUDY OF DISTRICT KULLU, HIMACHAL PRADESH

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**ABSTRACT**

This study examines how apple farmers in Kullu Valley of the Himachal Pradesh takes up the challenges of unfavorable and fast changing environmental condition in order to preserve apple crop farming in their respective areas. In many areas of Himachal Pradesh, apple has been the major source of income, and the rise in temperature over years has adversely affected apple cultivation in this region. All possible efforts are contributed by the government, local organisations and individual growers to save the crop from the environment chaos and challenges. The innovative farmers of Kullu have shown the way by converting theses environmental threats into opportunity, and beautifully so, with local resources and without use of costly inputs.

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## INTRODUCTION

Kullu Valley in the state of Himachal Pradesh in north-western India has experienced a number of crop failures in the last 15 years that apple growers blame on a changing climate no longer suitable for apple production. Growers' perceptions of climate correspond closely with the meteorological record in the valley (Vedwan and Rhoades 2001). Not only the aspects of climate but even the climate categories, which are perceived as having changed, are those that scientifically affect apple production the most. (Vedwan 2006).

Apple is a predominant fruit crop of Himachal Pradesh and in recent years it has emerged as the leading cash crop amongst fruit crops. Among all fruits, apple is the main crop of Himachal Pradesh occupying the place of pride in its economy. Though Kullu in Northern Himachal Pradesh is well known for apple cultivation, the lower areas were also suitable for apple cultivation (Anonymous 2006).

This year the Himachal region saw the temperature go up to 33.5 degree Celsius, the highest on record. Annual apple productivity has been dipping since 2003, when it was 6.46 tonnes per hectare. This year it is likely to be 4.31 tonnes per hectare. Last year, apple production in Himachal Pradesh was 21 million boxes. This year, it came down to 10 million boxes because of less snowfall in winter and drought in the ensuing months." According to Himachal Pradesh horticulture department's survey the apple yield is likely to be 1.2 crore boxes this year, which is half of the state's contribution last year.

The overall productivity has been declining as evident from the fact that the yield has come down from nine tonnes per hectare in the early 1970s to around six tonnes over a period of three decades. Global warming has made apple cultivation unsustainable at a height lower than 5,750 feet. Six-seven years ago, in the same orchard in which 5000-6000 boxes of apples were produced but this year growers haven't managed even 1500-1600 boxes in that orchard. These changing climatic conditions will be havoc for the orchard owners in this area (Gupta, 2009).

Jindal *et al*. (2001) reported that winter temperatures and precipitation especially in the form of snow are very crucial for induction of dormancy, bud break and ensuring flowering in apples. They further reported that apple requires 1200-1500 hours of chill depending upon the variety. The chilling below 1000 hours results in the poor fruit set which consequently lead to poor yield of the crop. People perceived a definite reduction in snowfall over time. More specifically,

snowfall events were thought to oscillate in 2 important ways: (1) reductions in the intensity of snowfall and (2) changes in the timing of snowfall.

However, the rise in temperatures over years has adversely affected apple cultivation in both these regions. Trees will develop one or more of the physiological symptoms associated with insufficient chilling: 1) delayed foliation; 2) reduced fruit set and increased buttoning and 3) reduced fruit quality. These physiological symptoms consequently affect the yield and quality of the fruit. (Rana et al. 2009).

Innovation is often used in conjunction with terms such as creativity, design, invention, and exploitation. It is also closely associated with terms such as growth and changes. Today it is said to involve the capacity to quickly adapt by adopting new innovations (products, processes, strategies, organization, etc) (Sullivan and Dooley, 2008). According to the New O Oxford Dictionary of English, 1998, Innovation means making changes to something established by introducing something new. However in 2008, Sullivan and Dooley asserted that applying innovation is the application of practical tools and techniques that make changes, large and small, to products, processes, and services that result in the introduction of something new for the organization that adds value to customers and contributes to the knowledge store of the organization

Gary Hamel argued that today's market place is hostile to incumbents, who now needs to conduct radical business innovation via Radically reconceiving products and services, not just developing new products and services, Redefining market space and Redrawing industry boundaries (Hamel, 1996).

The main patterns of crop-climate interaction that underlie apple farmers' perception of climate change concern the impact of changed climatic conditions on (1) blossoming and yield, (2) fruit quality, and (3) ecological ramifications.

- Firstly, climatic changes alter the pattern of blossoming, bearing and, therefore, fruit yield.
- Secondly, climate changes affect apple quality. Moreover, the degradation of quality is not uniform throughout the valley; there are distinct patterns. People often remarked that the apple belt is moving up in the valley i.e. comparatively at higher altitude.
- Lastly, there are ecological ramifications of changes in climatic conditions. There is a widely held perception that the increasing incidence of pest and disease comprises a shift in disease

ecology and that climate change has played a vital role. Kanker, a disease that causes a tree to decay, has become more rampant.

## RESEARCH METHODOLOGY

Data was collected using Purposive sampling technique from 15 orchard owners and 15 workers to find out shift in apple growing practices and innovative practices adopted for the betterment of the crop production under stressful and unfavourable environment conditions.

In-depth interviews through open ended discussion guide were conducted; thematic and comparative method was used to analyse this collected qualitative data.

## RESULTS AND DISCUSSION

Changing climate in North Western Himalayas have brought forth myriad new problems and new questions, the solutions to which will be generated by combining farmers' ingenuity, new technologies and several trial-and-error efforts. The farmers who tried new crops in early years with eventual success have presented a nice example of quick and discretionary adaptation to changing scenarios. In fast globalizing world establishing backward-forward linkages did not prove a big challenge. On one hand, it may appear that global warming is posing a threat to establish systems. On the other, it has also brought us face-to-face with new opportunities.

The innovative farmers of Kullu have shown the way by converting threat into opportunity, and beautifully so, with local resources and without use of costly inputs. Their response to this situation has been exemplary. Accepting change and getting in tune with nature is the key to survival and prosperity. Many new practices and techniques are adopted by the farmers in order to meet the timely demand of market and to ensure high productivity and best quality products (Meena and kumar 2008).

- Various new kind of planting patterns are followed i.e. square or hexagonal pattern is followed in Valleys and Contour method is followed on slopes.
- Considerable shift towards Grafting methods which primarily involves Tongue grafting (Stem grafting) and Branch Grafting in order to ensure the yield of the apple type which is most in market demand.

- New Pollination methods adopted are :-
  - First kind of pollination is made possible by alternatively growing red delicious trees to the trees of variety (Female species of apples). Here the pollinating agents are natural i.e. butterflies, honeybees, wind etc.
  - Another kind of pollination is made accessible by growing one tree of variety around many trees of red delicious. Here pollinating agents are similar to that of first kind i.e. butterflies, honeybees, wind etc.
  - The kind of pollination which is primarily and most commonly practiced is one whereby both the variety and royal delicious are grown on the single tree. This is made possible by grafting either the variety or royal delicious inversely. Here again the pollinating agents are natural ones.

The growers, however, responded by saying that the decrease in number of pollinizers had preceded the decline in apple performance. Jimmy Johnson of Raisan (District Kullu, Himachal Pradesh) elaborated:

Due to climate change there is gap between the flowering periods of males and females leading thus to ineffective pollination. In fact, Golden Delicious is no longer a pollinizer, as it flowers either before or much after Royal Delicious. Scientists and local farmers were clearly not looking at the problem through the same set of eyes. Farmers believe that the 'disturbance' in climate is at the heart of a series of interrelated and fundamental changes, which are adversely affecting the performance of apple. Scientists, on the other hand, tend to emphasize interventions and management techniques that can be implemented by farmers to offset the impact of the downturn.

Many new methods are adopted to ensure quality pollination. These methods include:

- Firstly, Honey bee boxes are made available to Growers by HPMC (Himachal Produce Marketing Committee) at the monthly rental of about Rs 200 per box. Growers hire these boxes as per their need and opens them at some appropriate positions in their orchards and these honey bees makes pollination possible by moving from one tree to another.
- Secondly, there are some Growers that collects pollens (PRAAG) of the variety i.e. Red Golden, Commercial etc and wash them under running water and then spray them on the flowers of the Red delicious to facilitate pollination.

- Moreover some Growers collect small branches of variety i.e. Red Golden, Golden, and Commercial etc and put them in a special kind of polythene available in market. Then these polythenes are filled with water and are hanged on the branches of Royal Delicious tree so that either natural or artificial used pollinating agents can facilitate cross pollination.

  Indian Agricultural Research Institute (IARI) in Katrain (district Kullu, Himachal Pradesh) explained (as Quoted by Vedwan 2006):

  People have cut down pollinizers and planted Red Delicious for commercial reasons. Those who are managing their orchards well still get good crops. Has weather not changed for them? Also, there is a lot of herd mentality. People have sprayed excessive amounts of pesticides and killed pollinators like honey bee. They should no longer expect to get good crops without making any effort.

  A number of scab-resistant cultivars have been introduced and used in Himachal Pradesh that became a good substitute for Delicious apples in scab-prone areas. Some of these varieties include Prima, Florina, Coop 12 and Coop 13 (Red free) which has shown promising performance in this area.

- Hybrid varieties of apples like Ambred (Red Delicious x Ambrich), (Richared x Ambri) and Ambroyal (Starking Delicious x Ambri) has been introduced but has not hained popularity due to late maturity and extended harvesting period.
- Introduction of low-chilling varieties has expanded the scope of apple cultivation to warmer and marginal areas of Himachal Pradesh where either the cropping is impossible or crops grown are not of appropriate quality.
- The most suitable pollinating cultivars used are Red Gold, Golden Delicious in order to increase the productivity of the Royal delicious variety (Awasthi and Chauhan 1997).
- Anti-Hail guns and Anti-Hail nets during the flowering and fruit setting season.are used these days tonnes protect the crop from the hailstorm and other environmental
- With apple production being greatly affected, farmers are steadily moving towards other crop options. Farmers have shifted to cultivation of pomegranate, kiwi and organic vegetables like garlic, tomato, peas, cauliflower, broccoli, cabbage, lettuce etc. i.e., diversion from cultivation of traditional crops (Meena and Kumar 2008).

## CONCLUSION

Thus, by adopting these above mentioned practices and many more, the apple growers from time to time has defended to the endowed agro-climatic conditions of the Himachal Pradesh. From decades, In many areas of Himachal Pradesh, apples has been the major source of income, and all possible efforts are contributed by the government, local organisations and individual growers to save the crop from the environment chaos and challenges.

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