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Diversity, Status, and Conservation Related
Issues of Biota in Himachal Pradesh Region
of Northwestern Himalayan Ecosystem

Edited by
Dr. Harinder Singh Banyal
Dr. Nitesh Kumar
Dr. Arti Jamwal Sharma



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**Biodiversity, Conservation Strategies and Human Health:
An Approach for Sustainable Development**

Edited by

Dr. Nitesh Kumar Dr. Sunita Saklani
Dr. H.C. Negi Dr. Arvind Kumar



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- **Transformation of India:
Exploring Multifaceted
Dimensions**

Dr. Anupama Tandon

FREEMAN
P R E S S
NEW DELHI

Transformation of India: Exploring Multifaceted Dimensions

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Role of Indo-Asean Trade in the Transformation of the Economy

Dr.T.D.Verma: Associate Professor, Department of Commerce, Govt. College Rampur Bushahar HP.

Abstract

The process of globalization involves the integration of various economies across the world through the exchange of ideas, capital, trade, and culture. Indo-ASEAN relations are being promoted and enhanced under India's Look East Policy initiated in 1991, renamed as Act East Policy in 2014. The rich historical and cultural ties provide a solid foundation for this mutually beneficial partnership. Over the last three decades, both sides have increased cooperation in economic ties, cultural relations, and other areas. China's aggressiveness and unilateral actions in the region have further brought India and ASEAN closer on strategic issues. The economic bloc is hesitant about strategic games due to China's economic and military power. In this context, India has initiated the process of developing robust defence ties with ASEAN members such as Vietnam on a bilateral basis. The strategic agenda is largely shared by QUAD, having common interests in the region. The elevation of Indo-ASEAN to comprehensive strategic partnership in 2022 will provide a boost to the emerging strategic partnership. The promotion of trade and investment, connectivity, energy security, and cultural cooperation are several dynamics with tremendous potential for the development and growth of the region. Therefore, this paper attempts to analyse the role of Indo-ASEAN trade relations in the transformation of the economy to achieve Atmanirbhar Bharat in the backdrop of global economic uncertainties and the outbreak of the Covid-19 pandemic.

Keywords: Globalisation, Transformation, Strategic Partnership, Act East Policy, Atamanirbhar Bharat

Introduction

During the Cold War, ASEAN-India ties could not develop to their full potential due to the constraints of the geopolitical landscape.

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Diversity of Insect-pests Infesting Apple Orchards in Himachal Pradesh

Neelam Kumari, Mamta Kumari, Ritu Sharma &
Yojna Thakur ✓

Abstract

Horticultural practices play a crucial role in the economy of India. Among horticultural fruit crops, apples are cultivated on a large scale. Due to its great significant food value, it is broadly cultivated as a temperate fruit crop all around the world. Apple is one of the most predominately cultivated fruit crops in the northwestern Himalayan region of India (Sharma, 2018). China is the chief producer of Apple and India ranked 5th with an average production of about 2316 metric tons (FAQ, 2019). In India, apple is cultivated in three hilly states i.e., Jammu and Kashmir, Himachal Pradesh, and Uttarakhand. After J & K, Himachal Pradesh stands second in apple production in India. In Himachal Pradesh, apples are produced in the high altitude of all districts except Una. Shimla district has the highest contribution i.e., around 60 percent in apple production. Apples are cultivated in the upper regions of Shimla district mainly in Kotkhai, Jubal, and Rohru. Especially, it covers 48.48 percent of total area under fruit crop and 89.14 percent of total fruit production in Himachal Pradesh (Horticulture Development in HP at a Glance, 2015). The state has noticed a great shift in the area from food grains towards horticulture crops over the last five years from 2012-13 to 2017-18 (Horticulture Development in HP at a Glance, 2018).

INTRODUCTION

In current years, apple cultivation has come out as the leading cash crop among all fruit crops. The area under fruit production, which was merely about 792 hectares in 1950-51 with total production of 1200 tonnes, has risen to 2.32 lakh hectares during 2018-19 with production of 4.95 lakh tonnes (Samriti *et. al.*, 2021). According to the report of Economic Survey of H.P., 2019-20, apple alone account for around 49 percent of the entire area under fruit crops and around 88 percent of the entire fruit production. In Himachal Pradesh, it also becomes the economic drive with 1.05 lakh hectares area under apple production. With advancement, the apple producers are adopting high density apple plantation because of its advantages i.e., good quality and productivity, precocious bearing, minimum labour intensive thus higher yield. Different apple varieties planted under high density plantation are Red Velox, Super Chief with Redlum Gala, Gale Gala and Auvil Early Fuji as polinisers. Like all other crops, high density plantations are impacted by numerous biotic and abiotic variables. Insect pests and infections are among the biotic variables that are known to affect the nutritional value and productivity of apples. Some of those insect pests seriously harm apple crops, so they must be properly controlled in an ecosystem with a high density of apple trees.

According to Bharadwaj and Bharadwaj (2005), insect-pests like San Jose scale, European red mite, thrips, codling moth and woolly apple aphids are reported to cause damage to apple trees. Among these insect-pests, adults, larva or immature stages of weevils are also reported damaging the apple crops. Heavy weevil infestation causes injurious effects on apple trees.

The likelihood of an invasion by exotic insect pests grew along with the expansion of agricultural trade globally. An impending shift in pest status is due to changes in cropping patterns, climate change, the indiscriminate use of various pesticides, and the introduction of input-intensive, high-yielding cultivars and hybrids. Since many insect pests have widened their range of potential hosts and built up resistance to pesticides, they have become significant pests (Rathee, 2018). Attacks by insect-pests, illnesses, disorders, etc., have a direct impact on apple fruit yield, fruit quality, and even the expansion and growth of the apple plants. Among these, a huge variety of insect pests and illnesses commonly occur at all phases of growth, forcing producers to incur significant financial loss because they must spend so much on pesticide applications (Altaf *et. al.*, 2019). Numerous insect pests have been discovered on apple trees alone, out of the thousands that have been documented from moderate fruit trees worldwide (Gupta and Pathania, 2017). Sherwani *et. al.*, (2016) documented the presence of significant insect pests on apple trees in various Kashmiri orchards.

The major insect-pests infesting apple plants in different regions of Himachal Pradesh are:-

1. European Red Mite:-

Scientific Name: *Panonychus ulmi* (Koch.)

Family: Tetranychidae

Order: Acarina

European Red Mite is native to Europe; it was first introduced into the Pacific Northwest region in the early 1900s. Since then, it spread throughout the apple producing countries of the world. Adults of this species are easily recognized by their brick red colour. This mite has been collected in most of apple growing regions of Himachal Pradesh that reduces plant growth and fruit quality. Bharadwaj & Bharadwaj (2005) recorded high levels of this mite on apple orchard in Himachal Pradesh. The infestation of the mite is so high that Indian Council of Agricultural Research has established a centre at Mashobra to tackle the problem of *P. ulmi* in the region. Apart from apple, it also causes damage to pear, almond, peach, apricot and walnut in temperate areas including Himachal Pradesh and Kashmir (Tajamul, 2018). Its preference to Red Delicious cultivar variety of apple is of much economical concern because of large scale production of 'Red delicious apple' in Kashmir (Tajamul, 2018). The severity of incidence of this insect-pest is recorded during June- July every year because of their increased population build up which is influenced by temperature and humidity (Ahmad *et al.*, 2020). Excessive de sapping by all the stages of mites' interrupts the normal transport of fluid and food from leaves to twigs and fruits which affects the size and quality of apple. During severe infestation browning or bronzing of leaves occur which causes defoliation mostly in non irrigated apple orchards (Tajamul, 2018). Besides adverse effects on apple, European red mite also involved with the development of allergy such as asthma and rhinitis in apple farmers.

2. San Jose Scale:-

Scientific Name: *Quadraspidotus perniciosus* (Comstock)

Family: Diaspididae

Order: Hemiptera

This insect-pest has been introduced in Kashmir valley and Himachal Pradesh during the first decade of twentieth century (Hussain *et al.*, 2018). This is reported as the most destructive and key pest of apple crop in all locations. The emergence of San Jose scale starts in the beginning of June and remains active throughout the whole apple season. The female of this pest have circular covering and that of the male is elongated. Males are winged and females are wingless. Nymphs and adult females of San Jose scale attack the above ground parts and suck sap from twigs, branches and fruits (Gupta *et al.*, 2019). This insect-pest forms dense colonies, mostly overlapping encrustations on branches and trunks, stems and spurs. An infected apple has thousands of insect-pests on it. The spots appeared on the fruits show characteristic symptoms of purplish red colour when they start to feed on the fruit. While the attacked branches show ash grey symptoms. Sucking of the apple tree by this pest leads to reduced growth and eventually death of the tree. Trees that are infested with San Jose scale produced small, immature apples, and infested apples were poorly colored. San Jose scale infestation can be easily identified on the infested branches and fruits because they turn grey or black in colour and ultimately, ash coloured. If heavy pest infestations are left unchecked, trees may be seriously damaged, resulting in

reduced vigor, thin foliage, cracked or dying branches, and the eventual death of the tree (Wani *et al.*, 2022). These have been found major threat to the high density apple orchards in comparison to traditional orchards. Despite targeting this insect-pest with recommended control measures, apple growers have faced severe economic losses due to the build-up of populations of San Jose scale in their orchards (Irish-Brown and Pochubay, 2019).

3. Indian Gypsy Moth:-

Scientific Name: *Lymantria obfusca* (Walker)

Family: Lymantriidae

Order: Lepidoptera

It is distributed in Himachal Pradesh, Punjab and Jammu and Kashmir (Hussain *et al.*, 2018). Nowadays, it is considered as a minor pest on apple in Jammu and Kashmir. Males of this moth are small and dark brown in colour with blackish markings and are strong fliers. Female moths have atrophied wings and are not able to fly. Caterpillars of gypsy moth are voracious feeders and feed gregariously on leaves of apple trees during the night time. Heavy infestation by the caterpillars results in complete defoliation of leaves and poor quality or failure of apple fruit formation. The larvae have nocturnal feeding habits and shelter during the day on limbs or branches of the infested tree. To estimate the overwintered population, gypsy moths overwinter as in the egg stage, therefore, egg monitoring and survey should be carried from the month of July to the month of March.

4. Tent Caterpillar:-

Scientific Name: *Malacosoma indicum* (Walker)

Family: Lasiocampidae

Order: Lepidoptera

Tent Caterpillar is distributed in north-western India and is the most serious pest of apple orchards in Himachal Pradesh and Jammu and Kashmir. The adults of this caterpillar are brown and yellowish moths with two diagonal markings on their front wings. Only one generation of this insect-pest is completed in a year. These caterpillars rest during day time in tents formed by web at the forking of twigs and feed voraciously during the night on leaves lamina (Wani *et al.*, 2022). The leaves attacked by caterpillars are skeletonised leaving behind the midrib and veins. In most severe cases, 40-50 % of apple plants in a garden can be defiled.

5. Apple Stem Borer:-

Scientific Name: *Aeolesthes sarta* (Solsky)

Family: Cerambycidae

Order: Coleoptera

In India, apple stem borer is widely distributed in Kashmir and Himachal Pradesh. Adults of this insect-pest are dark brown in colour with mottled yellowish pubescence on the elytra. Antennae of the male pest are 1.5 times

longer than their body length, while females' antennae are of the same length. The newly hatched grubs feed on the bark of the tree and make zigzag galleries. Grubs bore and feed on sap wood, throwing frass out from the exit hole. Flow of sap is blocked or restricted by such type of feeding. Due to this, the vitality of the tree is reduced that leads to death of the plant. The infestation of these insect-pests can be observed on the branches and main stem by visible exit holes with a diameter of 1 to 2 cm. Sap oozes out from these exit holes made by grubs. When the grubs penetrate deep into the stem or branches, coarse saw dust comes out from these exit holes, which can be observed clearly on the ground.

6. Apple blossom thrips:-

Scientific Name: *Thrip carthami* (Shumsher)

Family: Thripidae

Order: Thysanoptera

These insect-pests are distributed in apple orchards of Himachal Pradesh and Jammu & Kashmir (Hussain *et al.*, 2018). Nymph and adult of thrip feed by rasping the petal, vital flower parts and leaves of apple tree. They destroy the fruit before petal fall by puncturing the flower and egg-laying. The egg-laying site bulge out and form yellow patch which is called as Pansy Spot. Pre bloom feeding by thrips weakens the apple flowers by sucking the sap that results in poor fruit set. In case of heavy infestation by thrips, the orchard fruit production is reduced.

7. The Bark Beetle:-

Scientific Name: *Scolytus nitidus* (Schedl)

Family: Scolytidae

Order: Coleoptera

Bark beetle is distributed in Himachal Pradesh, Jammu and Kashmir and Uttar Pradesh (Hussain *et al.*, 2018). Its infestations are increased during dry and hot weather conditions. It becomes most serious pest in un-irrigated slopes of Kashmir Valley especially in apple orchards. Adult beetle has shining black pronotum and dark red brown elytra with declivous abdomen. The adult beetles have life span of 45-60 days. The adult females of bark beetles cause damage by girdling a shot-hole in the inner bark (the phloem-cambial region) on branches, twigs or trunks of apple trees. This activity often results in falling of parts of plants on the surface of soil. Small emerging holes present in the bark of trees are a good indication of the presence of bark beetles. Removal of the outer bark with the emergence holes often shows dead and degraded inner bark. Galleries are formed by the beetles under the bark due to which the blocking of food and water is severely hindered. During the early part of the attack, the tree does not show any symptoms, but growth of the tree is arrested. Attacked trees show a reduction in foliage and fruit yield.

8. Green apple aphid:-

Scientific Name: *Aphis pomi* (De Geer)

Family: Aphididae

Order: Hemiptera

Apple plants are the foremost host of green apple aphid in Himachal Pradesh, Assam and Jammu & Kashmir (Gupta & Tara, 2015). Minor infestation of these aphids has also been reported on citrus and pear. It is considered as an important pest of *Malus* sp. and its infestation is most commonly found in nurseries than in orchards by sucking the sap as well as by transmitting the viral diseases. It was found mainly in large numbers on young, tender and non-bearing shoots and almost all the existing varieties were infested. Both nymphs and adults of this insect-pest suck the plant juice resulting in the yellowing and curling up of the leaves, shedding of blossoms and dropping of the young fruit untimely that leads to the impairment and degradation of the quality of fruits. It also stimulates the growth of lateral branches and affects tree shape (Wani *et al.*, 2022). Heavily infected plants do not proliferate normally. Green aphids lie close to major veins on the ventral surface of the leaf. These aphids also secrete a sticky substance called honeydew which falls on leaves and fruits resulting in blackening of fruits and leaves. This honeydew also encourages the growth of fungi on the plants which reduces the market value of the fruit.

9. Apple Root Borer:-

Scientific Name: *Dorysthenes huegelii* (Redtenbacher)

Family: Cerambycidae

Order: Coleoptera

Apple root borers are distributed in Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Punjab and Tamil-Nadu (Hussain *et al.*, 2018). The body of this insect-pest is large, robust and reddish brown in color with long serrated antennae. The grubs of this pest feed on the roots and cause girdling of the roots and feed on the internal tissues (Sherwani *et al.*, 2016). The main roots of plants are severely damaged by root borers from the base and the trees become weak which fall down with strong winds. Infested apple trees become weak, shaky and may die.

10. Burr-knot borer (Black vine weevil):-

Scientific Name: *Otiorhynchus* sp. (Germer)

Family: Curculionidae

Order: Coleoptera

Burr-knot borers (Black vine weevil) are new emerging insect-pests which are reported to cause damage to the apple crops grown under high density apple plantation. Kumari *et al.*, (2022) reported harm caused by burr-knot borers to apple plants planted under high density apple plantation in Shimla district of Himachal Pradesh. The emergence of these burr-knot borers started from the month of March. They mainly cause damage to the burr-knots produced from apple trees. These apple weevils sometime enter through the burr-knots produced on the trunk of the trees, feed on the internal tissue and lay eggs inside these burr-knots. Newly hatched larvae from the eggs feed inside tissue which

is considered to be less harmful type of feeding. After that they start to move outward and feed on the surrounding bark which eventually leads to girdling. Adult weevils also feed on the leaves of the plants, give rise to a distinct pattern of injury and generally cause "notches" which are different from the injuries caused by the other insect-pests such as caterpillars. Adult feeding does not cause serious effect on the plant health but it decreases the economic value of ornamental plants (Fezza *et. al.*, 2022).

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Addressing the Climate Crisis in the Indian Himalayas

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Situating Culture in Sustainable Development Discourse: Reflections in the Context of the Himalayas



Sachin Kumar and Amit Shoshta

Abstract “Culture” and “development” are two concepts in social and behavioural sciences that have always eluded exact and universally agreed definitions. At the same time, the interrelationships between these two constructions have gained significance in recent years, and discussions about culture *in, for, and as* development abound. This chapter is based on the basic idea that unless the paradigm behind an intervention is consistent with the history, values, and beliefs of a specific community, it will be ineffective. It eventually concludes that in the context of the Himalayas, the diversity of cultural expressions and assets must be documented, preserved, and promoted; a cultural perspective should inform all developmental aspects (livelihoods, industries, housing, social and environmental policies); and, in the long run, efforts must be made to engender broader transformations towards more holistically sustainable mountain societies through increased awareness and capacity. This chapter begins with a summary of the complicated implications of the terms “development” and “culture,” presents an analysis of significant discourses around their relationships, and identifies essential imperatives for implementing a culture-resonant developmental paradigm. The next section presents the backdrop of the Himalayas and then briefly describes two illustrations of culture-resonant development initiatives in the Himalayan state of Himachal Pradesh, the first one is an example of a product-based initiative and the second one exemplifies a service-based enterprise. The final section lists key imperatives for putting Himalayas on a culturally-driven and culturally-concordant developmental trajectory.

Keywords Culture · Development · Himalayas · Mountain development · Sustainable development goals

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