

Commercial Cultivation of *Malus Domestica* and its Disease Management in Kashmir Valley

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Abstract: Apple (*Malus Domestica*) are most widely planted and are commercially most significant and economically important fruit crop in the Union territory of Jammu and Kashmir. It accounts for about 49 per cent of total area of 1.64 lac hectares under all temperate fruits grown in this UT. Different varieties of *Malus Domestica* are grown in Kashmir valley viz., Golden Delicious (Late Season), Lal Ambri, Mollies Delicious, Starkrimson, Red June, Irish Peach, Benoni and Tydeman's Early. The annual apple production in the state is 18.82 lac M. tons (2018-19). Apple is an extremely important source of nutritive diet, this provides a major source of income and employment in Jammu and Kashmir. Diseases and pests are one of the limiting factors for low productivity of the fruit crops in Kashmir valley.

Keywords: Apple (*Malus Domestica*), production, disease management, etc.

1. Introduction

Apple (*Malus domestica* Borkh.) is one of the most cultivated and consumed fruits in the world, being praised as a miracle food, economically significant, nutrient-rich fruit grown in all temperate zones (Spengler, 2019). There is an old Welsh proverb "An apple a day, keeps the doctor away" that most of us are familiar with, indicating the significance of consuming apple. Apples are extremely rich in important antioxidants, flavanoids, dietary fibre, vitamins and other nutritive substances. They are inimitable in human nutrition since they increase immunity, have a positive effect on stress resistance, and they contain many bioactive substances that are helpful for humans. There is no doubt that apples are healthy and have many health benefits, but it was modern medicine, based on evidence, not experience, which had to prove their usefulness for human health (Boyer and Liu, 2004). Apple is the principle fruit crop of Jammu and Kashmir and accounts for about 49 per cent of total area of 1.63 lac hectares under all temperate fruits grown in this state. The annual apple production in the state is 17.27 lac M. tons (2016-17). Average yield of commercially important apple cultivars per unit area is the highest in the country ranging between 11-13 M. tons/ha, but it compares poorly to the yields of 20-30 M. tons/ha in horticulturally advanced counties of the world. In Jammu and Kashmir production constraints of Apple in the UT, among others

include a complex of key and secondary insects, pests and diseases. The pests and diseases of the apple trees not only reduce the productive capacity of trees but also affect adversely the fruit quality. Proper disease and pest management beyond doubt, contribute significantly in increasing the crop production on sustainable basis. Insects, pests and diseases frequently causing havoc to crops are quoted by (Sharma, 2000) to be one of the major shortcomings of horticulture. There are wide number of pests and diseases which are widely reported and quoted in a number of sources. Apple contributes 83 per cent of the total fruit production of UT J&K.

2. Materials and Methods

The study was conducted in UT Jammu and Kashmir. Kashmir valley was selected purposively on the basis of maximum area and production under apple crop. The data were collected from various sources like, published/unpublished records of the directorate horticulture/agriculture of J&K state, National horticulture board and department of horticultural Srinagar, Jammu & Kashmir.

3. Apple Cultivation and Production in Kashmir Valley

Different varieties of *Malus Domestica* are grown in Kashmir valley viz., Golden Delicious (Late Season), Lal Ambri, Mollies Delicious, Starkrimson, Red June, Irish Peach, Benoni and Tydeman's Early. There was continuous progress of area under apple cultivation in Jammu and Kashmir State from 138.02 hectares in 2010-11 to 164.74 hectares in 2018 to 19. The main reason for the increasing trend was mainly comparative advantage of this crop over the other commercial crops grown in high altitude region in the state. The production marked highest growth during 2015-16 worth 1966.42 metric tons. But the production decreased during 2012-13 because of untimely rainfalls in the state. There has been some loss to the Horticulture crop due to low temperature and due to unexpected rains followed by flood in some areas of the State.

4. Apple Disease and Management

With the intensification of apple cultivation there has been considerable increase in insect pest and disease infestation to

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Table 1
Apple cultivation and production in Kashmir valley

Year	Area cultivated (Ha)	Production (mt)	Productivity
2010-11	138.02	136.71	9.8
2011-12	154.72	1756.19	11.35
2012-13	157.28	1348.15	8.57
2013-14	160.87	1647.69	10.24
2014-15	163.43	1170.31	7.16
2015-16	161.77	1966.42	12.16
2016-17	162.97	1729.83	10.61
2017-18	164.41	1882.77	11.45
2018-19	164.74	1882.32	11.43

Source- Department of Horticulture, Srinagar J&K.

Table 2
Apple disease and management

S.no.	Disease Name	Damaging	Integrated pest management (IPM)
1	San Jose scale	Both Nymphs and adults	Spraying of Chlorpyrifos 20 EC @ 1ml /l of Water Spraying of Dimethoate 30 EC or Quinalphos 25 EC @ 1ml /liter of water when emergence of crawlers has been noticed. Encarsia perniciosi and Aphytis diaspidis (Parasitoids of San Jose scale) are mass produced and mass released to check the San Jose Scale population.
2	European Red Mite	Both Nymphs and adults	Spraying of Fenazaquin 10 EC or Hexythiazox 5.45 EC @ 4 ml / 10 liters of water. Spraying of Fenpyroximate 5 SC and Propargite 57 EC @ 10 ml / liter of water
3	Codling moth	Caterpillar	Application of insecticides like Chlorpyrifos 20 EC, Dimethoate 30 EC @ 10 ml / 10 liter of water before the larvae penetrate into the fruit significantly reduces the fruit damage.
4	Indian Gypsy moth	Caterpillar	Application of Nuclear Polyhedrosis Virus (NPV) and spraying of Dimethoate 30 EC @ 1ml / liter of water if damage has been noticed in apple orchards
5	Woolly apple aphid	Both nymphs and adults	Spraying Dimethoate 30 EC and Ethion 50 EC @ 10 ml / 10 liters of water.
6	Tent Caterpillar	Caterpillar	Use Dimethoate 30 EC @ 10 ml / 10 liters of water when insect outbreak is observed
7	Apple stem borer	Grubs	Spraying of Chlorpyrifos 20 EC and Dimethoate 30 EC @ 10 ml/ 10 litres of water at the time of egg laying
8	Bark beetle	Grubs	Application of insecticides before the adults penetrate and lay eggs on the bark by using Chlorpyrifos 25 EC and Dimethoate 35 EC @ 10 ml / 10 liters of water
9	Apple leaf miner	Larvae	Application of systemic insecticides for the management of this pest when this pest attains an epidemic status.

Source: Directorate of research , SKUAST-Kashmir

apple crop in the state. The pest complex of apple includes a wide range of species with diverse habits. A number of pests viz., 9 on apple have been recognised, which on the basis of their importance and prevalence are given in below table

5. Conclusion

Apple (*Malus Domestica*) cultivation in Kashmir Valley is highly significant economic activity in the Union Territory, which is famous for its quality apple. It accounts for about 49 per cent of total area of 1.64 lac hectares under all temperate fruits grown in whole UT. Different varieties of *Malus Domestica* are grown in Kashmir valley viz., Golden Delicious (Late Season), Lal Ambri, Mollies Delicious, Starkrimson, Red June, Irish Peach, Benoni and Tydeman's Early. The annual apple production in the Union Territory is 18.82 lac M. tons (2018-19). Apple production plays an important role in improving the standard of living, per capita income and employment generation. More than half percentage of the population is engaged in the cultivation of apple directly or

indirectly in the state. Apple being state's main fruit has predominant position both in area under plantation and production. Diseases and pests are one of the limiting factors for low productivity of the fruit crops in Kashmir valley. Disease management and surveillance is much needed for the high production of different varieties of apple.

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