



"IMPACT OF 2014 FLOODS ON HORTICULTURE SECTOR OF JAMMU AND KASHMIR IN THE PLIGHT OF NATURAL DISASTER: A CASE STUDY OF APPLE INDUSTRY"

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Article history:	Abstract:
<p>Received: December, 26th 2020 Accepted: January, 13th 2021 Published: January, 24th 2021</p>	<p>Disasters are on the rise all the way through the world and may strike any destination without any warning. Almost all the nations of the world witness such disasters. Jammu and Kashmir experienced heavy monsoon rains that began on September 2, 2014 and lead to unprecedented widespread flooding and landslides across the state. The union territory of Jammu and Kashmir is the major producer of apples in India. As the dominant crop of the valley "Apple" proudly represents the fruit industry of the union territory. Therefore the study evaluated the impact of 2014 floods on apple industry of Jammu and Kashmir. It is found from the study that during the year 2015-16, there was loss of 1659 hectares in area under apple cultivation and the major reason for drastic decline is the soil erosion caused due to the destructive floods. Furthermore, the loss in production of apples during 2014 in terms of quantity was 477381 metric tones, resulting to the economic loss of 1444.97 crores approximately, which is a huge loss and it has almost paralyzed the economy of apple cultivators of Jammu and Kashmir.</p>

Keywords: Area, Economy, Floods, J&K, Loss, Natural Disaster and Production

1. INTRODUCTION

The union territory of Jammu and Kashmir is well known for its horticultural produce both in India and abroad. The favorable agro-climatic conditions, fertile soil and sub-tropical climate are ideally suited for the cultivation of horticulture crops and thus offer immense scope for the development of horticulture sector in the state (Bhat and Bhat, 2014)¹. The union territory offers good scope for cultivation of horticultural crops; covering a variety of temperate fruits like apple, cherry, pear, peach, plum, apricot, almond, cherry and sub-tropical fruits like mango, guava, citrus litchi, phalsa and berete (Rather, et al., 2013)².

Among the various tropical and subtropical fruits, Jammu and Kashmir is the major producer of apples in India. As the dominant crop of the valley "Apple" proudly represents the fruit industry of state. About 70 percent of apple production in India comes from the union territory of Jammu and Kashmir and percentage share of the union territory in India's total production as well as productivity is showing an increasing trend and is known as "apple state of India" and has been declared as the "Agri. export zone for apples and walnuts" (Darzi, 2016)³. Apple accounts for 86% by value of the union territory's horticultural output (Ghosal, 2014)⁴. In the union territory of Jammu and Kashmir, hundred and ten Varieties of apple are found which are different in their size, colour and taste. The chief varieties produced are Delicious, Ambri, Kullou Delicious, American, Maharaji, Kesari and Hazaratbali (Sheikh and Tripathi, 2013)⁵.

Flooding being a part of natural environment is a threat only when it impends harm to humans, their activities and their properties (Akhtar and Mir, 2017)⁶. According to the FAO, crop production in the period 2003 to 2013 was the most affected agricultural sector by natural hazards in developing countries and about 60% of the damages are attributed to floods (Englhardt, et.al, 2019)⁷. Jammu and Kashmir experienced heavy monsoon rains that began on September 2, 2014 and lead to unprecedented widespread flooding and landslides across the state. Banks of the river Jhelum, Chenab, Tawi and many other streams were burst. As of 16 September 2014, 300 people were reported dead and 25 suffered injuries due to floods in Jammu and Kashmir. As per the information of Government, in actual figures 2600 villages were reported to be affected in Jammu and Kashmir, out of which 390 villages in Kashmir were completely submerged. Over 234 relief camps were installed in the state and 23,900 people were rehabilitated from the Jammu region only (Govt. of J&K, 2014)⁸.

Devastating floods in Jammu & Kashmir have caused an immediate loss of 5,400-5,700 crore to the state's economy. The initial estimated loss to hotels, trade, agriculture - horticulture, roads and bridges in the Jammu & Kashmir regions itself is 2,630 crore. Besides, high-cost infrastructure like railways, power and communication in the hilly terrain would have suffered a loss of about 2,700-3,000 crore (Anonymous, 2014)⁹.

2.OBJECTIVES OF THE STUDY

- To examine the magnitude of destruction caused by 2014 floods in area under apple cultivation.
- To examine the magnitude of destruction caused by 2014 floods in production of apple farming in terms of quantity and value.
- To compare the magnitude of destruction caused by 2014 floods in production of apple between different apple producing districts.

3.METHODOLOGY OF THE STUDY

The present study is based on secondary data. The secondary data have been collected from various official sources like Ministry of Agriculture, Horticulture Statistics Division, Central Statistics Office, Joint Rapid Needs Assessment Report and Directorate of Horticulture – Srinagar. Further various published research papers, books, periodicals, reports, magazines, newspapers, and websites have also been used for the study.

4.STATISTICAL ANALYSIS

The statistical techniques used in this study are Average and Annual Growth Rate. Collected information was additionally evaluated with the assistance of different sorts of tables, pie outline, bar graphs etc.

$$\text{Average} = \frac{1}{n} \times \sum_{i=0}^n x_i$$

Where, A = average n = the number of terms
 X_i = value of each individual item in the list of numbers being averaged

$$\text{Growth Rate} = \frac{Y_t - Y_{t-1}}{Y_{t-1}} \times 100$$

Where, Y_t = Value of current year
 Y_{t-1} = Value of base year

5.IMPACT OF FLOOD ON APPLE INDUSTRY

The floods in J&K have caused a loss of ₹ 1,000 crore to the apple crop in Kashmir, threatening a collapse of the horticulture industry in the state. Apple has become costlier by 15-18% in the retail market over the past 10 days as the recent floods have wrought heavy damage to the crop in Kashmir, the region that accounts for nearly half the country's local supplies. Arrivals of the juicy succulent fruit from Jammu & Kashmir's Shopian and Sopore districts at Asia's biggest fruits and vegetables wholesale market at Azadpur in Delhi have come down by 30%-35% after the floods. "A 16 kg box which was costing around ₹ 900 a week or 10 days ago is now costing ₹ 1,000. This has happened because apple orchards in Jammu & Kashmir have been affected due to the floods." (Ghosal, 2014)¹³.

(a) Damages caused to Apple Industry by devastating floods in Kashmir

Though apple farming has bestowed the life of farmers with happiness and pleasure and lifted them on the peak, but unfortunately the floods washed away all the dreams of apple cultivators and left them hopeless and helpless. It is like a dooms day has come in their life and they are now in bitter part of the life.

The various damages caused to apple industry can be summarised as:

- ❖ Falling of leaves /fruits due to floods.
- ❖ Accumulation of water in and around orchard areas
- ❖ Erosion of orchard land.
- ❖ Siltation in the orchard areas.

(b) Loss of Area and Production

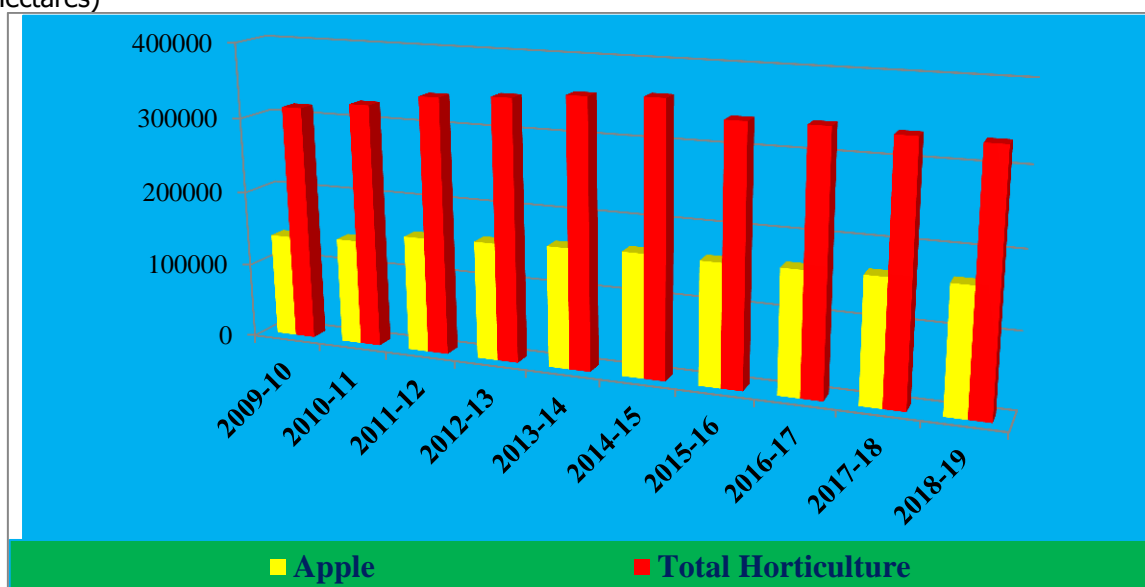
Table 1.1: Area under Apple and Total Horticulture Crops in Jammu and Kashmir – 2009-10 to 2018-19
 (Area in Hectares)

Year	Apple	A.G.R.	Total	A.G.R.
2009-10	138191	-	315089	-
2010-11	141717	2.55	325071	3.17
2011-12	154721	9.18	341372	5.01
2012-13	157280	1.65	346981	1.64

2013-14	160865	2.28	355092	2.34
2014-15	163432	1.60	359089	1.13
2015-16	161773	-1.02	337677	-5.96
2016-17	162971	0.74	338528	0.25
2017-18	164411	0.88	333728	-1.42
2018-19	164742	0.20	331585	-0.64
Average	157010.30	2.01	338421.20	0.61
Growth	19.21		5.24	

Source: Department of Horticulture, Jammu and Kashmir-Srinagar
 AGR = Annual Growth Rate

Graph 1.1: Area under Apple and Total Horticulture Crops in Jammu and Kashmir – 2009-10 to 2018-19
 (Area in Hectares)



Source: Based on table 1.1

The area under apple cultivation and total horticulture in Jammu and Kashmir from 2009-10 to 2018-19 is presented in table 1.1. It is apparent from the table that the area under apple cultivation increased from 138191 hectares in 2009-10 to 164742 hectares in 2018-19 with average of 157010.30 hectares and displayed remarkable growth of 19.21 percent during the study period of one decade. Similarly the area under aggregate horticulture increased from 315089 hectares in 2009-10 to 331585 hectares in 2018-19 with average of 338421.20 hectares and displayed marginal growth of 5.24 percent during the study period of one decade.

Analysing the annual growth rate, it is obvious from the obtained results that the area under apple cultivation has displayed positive annual growth rate throughout the study period except during the year 2015-16, when the annual growth rate was negative (-1.02), with average annual growth rate of 19.21 percent. Similarly the area under aggregate horticulture has displayed positive annual growth rate throughout the study period percent except during the years 2015-16, 2017-18 and 2018-19, but the lowest growth rate was displayed during the year 2015-16 (-5.96), with average annual growth rate of 5.24.

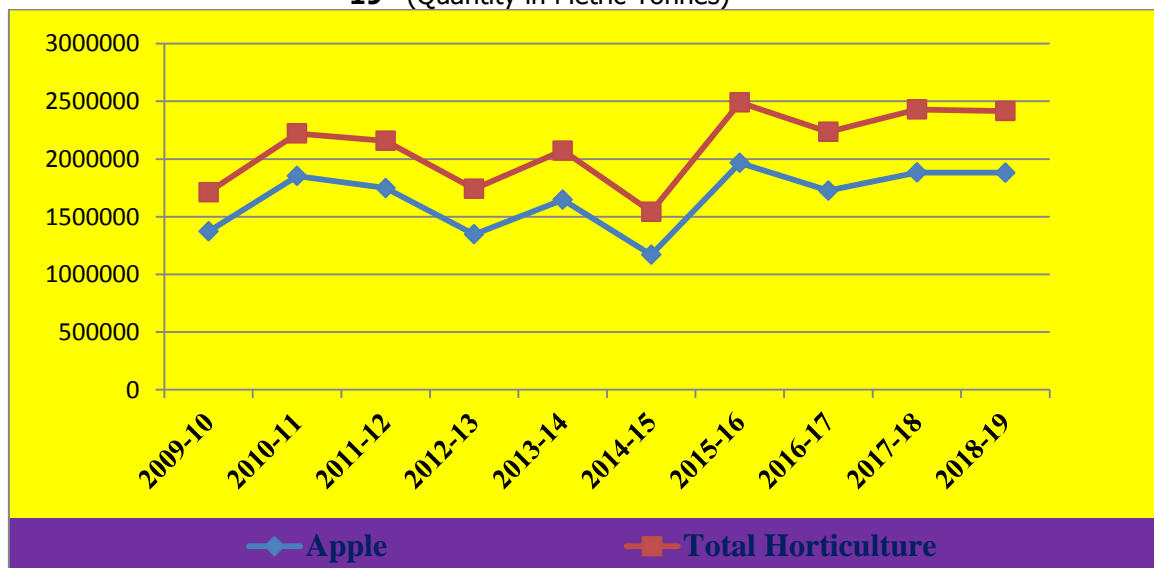
It is clearly found from the table 1.1 and graph 1.1 that during the year 2015-16, there was loss of 1659 hectares in area under apple cultivation and loss of 21412 hectares in area under aggregate horticulture during the year 2015-16. The major reason for drastic decline in area under apple cultivation and aggregate horticulture during 2015-16 is the soil erosion caused due to the destructive floods of September, 2014; which eroded thousands of hectares completely.

Table 1.2: Production of Apple and Total Horticulture Crops in Jammu and Kashmir – 2009-10 to 2018-19 (Quantity in Metric Tonnes)

Year	Apple	A.G.R.	Total	A.G.R.
2009-10	1372973		1712409	
2010-11	1852413	34.92	2221982	29.76
2011-12	1749227	-5.57	2157752	-2.89
2012-13	1348155	-22.93	1742124	-19.26
2013-14	1647687	22.22	2073948	19.05
2014-15	1170306	-28.97	1542676	-25.62
2015-16	1966417	68.03	2491002	61.47
2016-17	1726834	-12.18	2234980	-10.28
2017-18	1882774	9.03	2429822	8.72
2018-19	1882319	-0.02	2415421	-0.59
Growth	37.10		41.05	
Average	1659910.50	7.17	2102211.60	6.71

Source: Department of Horticulture, Jammu and Kashmir- Srinagar
 AGR = Annual Growth Rate

Table 1.2: Production of Apple and Total Horticulture Crops in Jammu and Kashmir – 2009-10 to 2018-19 (Quantity in Metric Tonnes)



Source: Based on table 1.2

The production of apple and total horticulture in Jammu and Kashmir from 2009-10 to 2018-19 is presented in table 1.2. It is apparent from the table that the production of apple increased from 1372973 metric tonnes in 2009-10 to 1882319 metric tonnes in 2018-19 with average of 1659910.50 metric tonnes and displayed remarkable growth of 37.10 percent during the study period of one decade. Similarly the production of aggregate horticulture increased from 1712409 metric tonnes in 2009-10 to 2415421 metric tonnes in 2018-19 with average of 2102211.60 hectares and displayed remarkable growth of 41.05 percent during the study period of one decade.

Analysing the annual growth rate, it is apparent from the obtained results that the production of apple has displayed positive annual growth rate throughout the study period except during the years 2011-12, 2012-13, 2014-15 2016-17 and 2017-18 when the annual growth rate was -5.57, -22.93, -28.97, -12.18 and -0.02 percent respectively, with average annual growth rate of 19.21 percent. Similarly the production of aggregate horticulture has displayed positive annual growth rate throughout the study period percent except during the years 2011-12, 2012-13, 2014-15, 2016-17 and 2018-19 when the annual growth rate was -2.89, -19.26, -25.62, -10.28 and -0.59 percent respectively, with average annual growth rate of 6.71 percent over the study period of one decade..

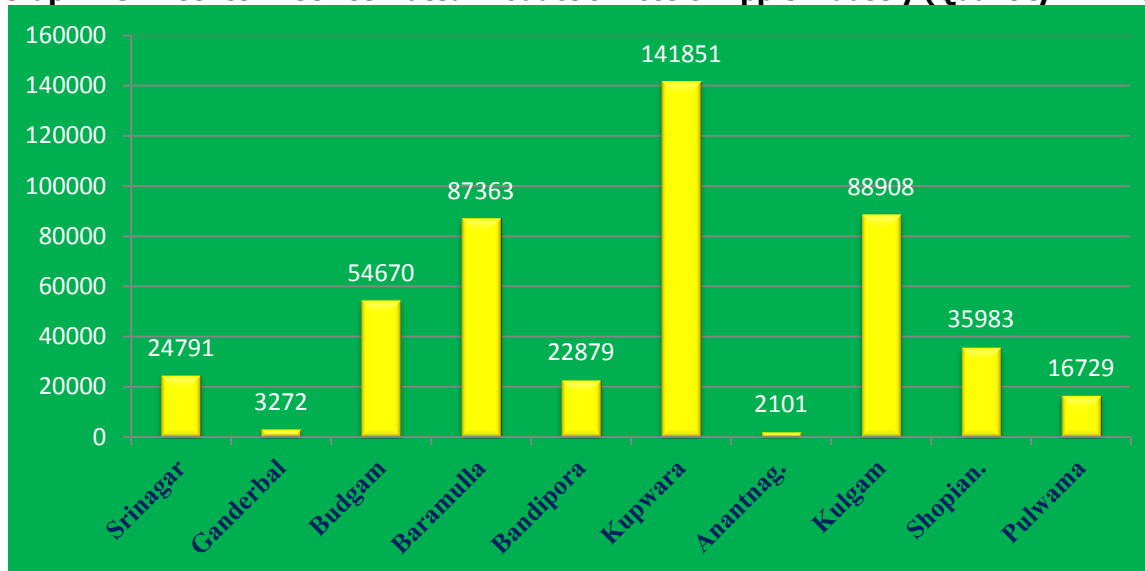
It is clearly found from the table 1.2 and graph 1.2 that during the years 2011-12, 2012-13, 2014-15, 2016-17 and 2018-19, there was decline in production of apple as well as aggregate horticulture, but the drastic decline in production of apple (477381 metric tones) and aggregate horticulture (531272 metric tonnes), when the annual growth rate was -28.97 percent and -25.62 percent respectively is observed during the year 2014-15. The major reason for the drastic decline in production is due to the destructive floods of September, 2014, which washed out huge amount of fruits and caused a huge loss in the apple industry and has almost paralysed the Apple industry of Kashmir.

Table 1.3: District-Wise Estimated Production loss of Apple industry (Quantity in MT's)

Year	Srinagar	Ganderbal	Budgam	Baramulla	Bandipora	Kupwara	Anantnag.	Kulgam	Shopian.	Pulwama
2013-14	39281	51800	86196	511000	53463	247220	151492	146426	219395	106911
2014-15	14490	48528	31526	423637	30584	105369	149391	57518	183412	90182
Loss	24791	3272	54670	87363	22879	141851	2101	88908	35983	16729

Source: Department of Horticulture, Jammu and Kashmir- Srinagar

Graph 1.3: District-Wise Estimated Production loss of Apple industry (Quantity in MT's)



Source: Based on table 1.3

The table 1.3 and graph 1.3 displays the district wise loss to apple production due to floods. It is clearly found from the table and graph that district Kupwara alone faced a huge loss of 141851 metric tonnes followed by Kulgama (88908 metric tonnes), Baramulla (87363 metric tonnes), Budgam (54670 metric tonnes), Shopian (35983 metric tonnes), Srinagar (24791 metric tonnes), Bandipora (22879 metric tonnes), Pulwama (16729 metric tonnes), Ganderbal (3272 metric tonnes) and Anantnag (2101 metric tonnes). Therefore, it is concluded that district Kupwara faced the highest loss (141851 metric tonnes) in apple production and district Anantnag faced the lowest loss (2101 metric tonnes) in production of apples due to September 2014 floods.

Table 1.4: Estimated Total Loss to Apple Industry Due to Floods September 2014

a	Production of apples during 2013-14	1647687 MT's
b	Production of apples during 2014-15	1170306 MT's
c	Loss in production during 2014-15 over 2013-14 (b - a)	477381 MT's
d	Loss of production in Kilograms (c × 1000)	477381000
e	Loss of production in boxes (d / 15)*	31825400
f	Average rate per apple box during 2014-15	₹ 454.03
g	Total loss in Rupees (e × f)	₹ 14449686362
h	Total loss in Crores	₹ 1444.96 (Approx.)

Source: Computed by author on the basis of data obtained from Department of Horticulture, Jammu and Kashmir- Srinagar

*15 kg's are in one box of apple

The estimated loss to apple industry due to destructive floods of September 2014 in terms of quantity and value is presented in table 1.4. It is clearly found from the obtained results that the loss in production of apples during 2014 in terms of quantity was 477381 metric tones and resulting to the economic loss of ₹ 1444.97 crores approximately, which is a huge loss and it has almost paralysed the economy of apple cultivators of Jammu and Kashmir.

6.CONCLUSION

"Apple is the mainstay of Kashmir's economy with a turnover of ₹ 1,200 crore a year and its production in the union territory has reached about 1.6 million metric tonnes annually". The sector also employs nearly 30 lakh people directly and indirectly. Jammu and Kashmir experienced heavy monsoon rains that began on September 2, 2014 and led to unprecedented widespread flooding and landslides across the state. Devastating floods in Jammu & Kashmir have caused an immediate loss of ₹ 5,400-5,700 crore to the state's economy. It is found from the study that during the year 2015-16, there was loss of 1659 hectares in area under apple cultivation and the major reason for drastic decline is the soil erosion caused due to the destructive floods of September, 2014; which eroded thousands of hectares completely. Furthermore, the loss in production of apples during 2014 in terms of quantity was 477381 metric tonnes and resulting to the economic loss of ₹ 1444.97 crores approximately, which is a huge loss and it has almost paralyzed the economy of apple cultivators of Jammu and Kashmir. District Kupwara faced the highest loss (141851 metric tonnes) in apple production and district Anantnag faced the lowest loss (2101 metric tonnes) in production of apples due to September 2014 floods.

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