



## Horticulture in Kashmir Valley: Opportunities and Challenges

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### Abstract

Horticulture industry benefits the economic well-being of the people involved and the economy of the state of Jammu & Kashmir. It increases the GDP of the state by approximately 9 percent (Directorate of Horticulture J&K Govt.). Horticulture crop production has increased since the inception of the state. In this study, the area under the horticulture crops is decreasing. Some of the horticultural crops in the valley are experiencing a rapid decrease. The aim of this study is to find the trend and variability of horticulture crops in the state of Kashmir. In this paper, we attempt to analyze the overall trends of the overall area, production and yield of the fresh & dry fruit crops in the Kashmir valley covering ten districts over a period of 50 years. Compound annual growth rate (CAGR) was used to calculate the growth and volatility of the area under the crop. The area under the crop showed a negative CAGR over the last 10 years while production and yield showed moderate volatility.



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Opportunities;  
Production.

### Introduction


Horticulture is defined as the branch of agriculture which is related to the cultivation of fruits, vegetables, medicinal plants, and ornamental plants for various purposes like apple and cherry are used for landscaping. Horticulture occupies an important place in the economy of Jammu and Kashmir as it has created many opportunities for the people engaged directly or indirectly in this field. According to the Department of Horticulture, Jammu and Kashmir, approximately seven lakh families are dependent on horticulture for their livelihood. The flourishing horticulture of state owes to its geographical location and consequent climate. Due to the favorable climate, many fresh and dry fruits are grown here namely

apples, walnuts, cherries, peaches, apricots, pears, and many more. By the Directorate of Horticulture, Govt. of Jammu & Kashmir, in 1970-71, the total area under horticultural crops was 0.48 lakh ha which has now increased to 2.12 lakh ha (2022).<sup>1</sup> It shows that cultivation of these crops has increased rapidly with time. According to NCERT, 2018; the basic reason for this increment is that these crops can be grown on small plots of land even on land less than a hectare, with undulating slopes, and produce more yields per hectare than cereal crops. Once planted, these can bear fruits for many years without worrying much about the plants' maintenance. Thus, it is like a one-time investment and reaping the benefits for a long time.<sup>2</sup> Along with the domestic market, there

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is a lot of demand for Kashmiri fresh and dryfruits in the international market as well.<sup>3</sup> The annual export has reached 70 billion from the fruits alone (2022). According to the Directorate of Horticulture, J&K, only apple cultivation provides job opportunities to more than 3.5 lakhs of families. This is the potential of only one crop. The other two potential crops are walnut and cherry. Keeping in view the increasing demand for horticulture crops and their economic potential, the concerned department has taken many steps to improve this sector. Many schemes have been implemented with the focus on increasing the productivity of crops, soil health, and introduction of high-yield varieties, and many more. Also, initiatives have been taken to educate the farmers about the same. All these efforts have resulted in the increased area and production of fruits along with the creation of jobs direct and indirect. Many schemes have been implemented with the focus on increasing the productivity of crops, soil health, and introduction of high-yield varieties, and many more. Also, initiatives have been taken to educate the farmers about the same. All these efforts have resulted in the increased area and production of fruits along with the creation of jobs direct and indirect. Planting, carrying out intercultural operations, controlling growth, harvesting, packaging, marketing, storage, and processing are all extremely important when it comes to horticultural crops. So there are several jobs in this one sector. Many agriculture-based industries can be created in the coming years and more employment can be generated. Concerning the agricultural, climatic, and historical factors, horticulture is the most dominant sector of agriculture, contributing nearly 8 percent to the GDP of Jammu and Kashmir. It has provided benefits and economic security to the farmers. But the question is will these benefits be continued for the times to come? For the past several years, the horticulture sector has faced a lot of blows in the Kashmir valley. The cold weather conditions associated with heavy rain and fast wind and hailstorm during the peak flowering period cause the pre-falling of flowers and prevent pollinator insects from pollinating. Presently Horticulture is facing many problems, some of which are: lack of market, lack of market information, competition from the international fruit market, reduced yield, insufficient storage facilities, and many more. High cost and substandard availability of fertilizers and pesticides, high cost of packaging materials and transport charges, competition from the fruits of Himachal

Pradesh and foreign countries like Iran, Labeling and marking other states fruits with Kashmiri Tags, labels and markings, shortage of high-density fruit trees to meet the growing demand of growers, Inadequate irrigation facilities and cold storage facilities, lack of crop insurance schemes, lack of Kisan Call Centers and Krishi Vigyan Centers for the information and timely guidance to growers, lack of awareness among people about new schemes, programs, and management.

Adoption of traditional plantation and methodologies of gardening by growers are major impediments to the horticulture sector. These all must be checked. Recent studies show that the production and yield of apples have remained high along with high stability. Walnut which has impressive demand in the international market and is exported to nearly 70 countries generating 10 million USD has remained unstable.<sup>4</sup> Besides Apples and other fruits that have a major share in horticulture in Kashmir, the fruits with a small share must also be given equal attention. There has been negligence of such fruits. For the holistic and sustainable development of Horticulture, every fruit crop should be given equal priority. The present study attempts to understand the spatial patterns and growth of all the horticulture crops in terms of the area under their cultivation, production, and yield. So, it aims to find out the growth rate of area, production, and yield of horticultural crops. Also, it aims to find the instability of the horticultural crops in all the decades in the study area.

### **Materials and Methods**

The Kashmir Valley is a valley situated within the Kashmir region of Jammu and Kashmir, which is under the administration of India as a Union Territory. It is a deep and uneven basin between the Pir Panjal and the Western edge of the great Himalayan Mountain range, with an average height of 1600 meters. It is about 135 km long and 32 km wide. The Jhelum River and its tributaries drain the valley. It has many beautiful lakes such as Dal, Wular, Nageen, and several others. The Himalayas separate the Kashmir valley from Ladakh. In terms of climate, there is about 750 mm of annual rainfall, which arises from both the summer monsoon winds and low-pressure systems during the winter season. Snowfall is often accompanied by rain and hail. Temperature changes due to altitude. The minimum average temperature in Srinagar ranges from 2°C

in January to the highest average temperature of 31°C in July. In the winter, the sheet of snow starts spreading everywhere and as soon as the autumn begins, the golden beauty of the yellow poplar starts to fascinate. Perhaps this is the reason why tourists from all over the country and abroad keep coming here.<sup>5</sup>

Secondary data was collected from the publications of the Directorate of Horticulture, Jammu and Kashmir for the area, production, and yield of fresh and dry fruits namely: apple, walnut, pear, cherry, plum, apricot, peach, and almond. For Apple, Cherry, Walnut, pear, and Almond, data is available from 1970-2020. But for the rest of the fruit crops individually, it only has been made available from 2001-02. Data collected for the fresh and dry fruit crops were used to estimate the growth pattern and variability from 1970-2020. Variability in yield is the main source of production instability and therefore Cuddy Della Valle Index was used.<sup>6</sup> It is an improvement over the simple coefficient of variation, as it corrects the coefficient of variation which is usually over-estimated in the simple coefficient of variation.<sup>7</sup> High growth and low instability are the ideal conditions for a crop, which are related to more technological and commercial development in the area, clever application of scientific knowledge in farming, and minimal volatility in crop production.

**Growth Rate**

Compound Annual Growth Rates of area, yield, and production were calculated using the exponential form of function

$$y = a (b)^t$$

Where y= yield, production and area, a=intercept, b=coefficient of regression and t=time period  
 $CAGR = \{(antilog\ b1)-1\} * 100^8$

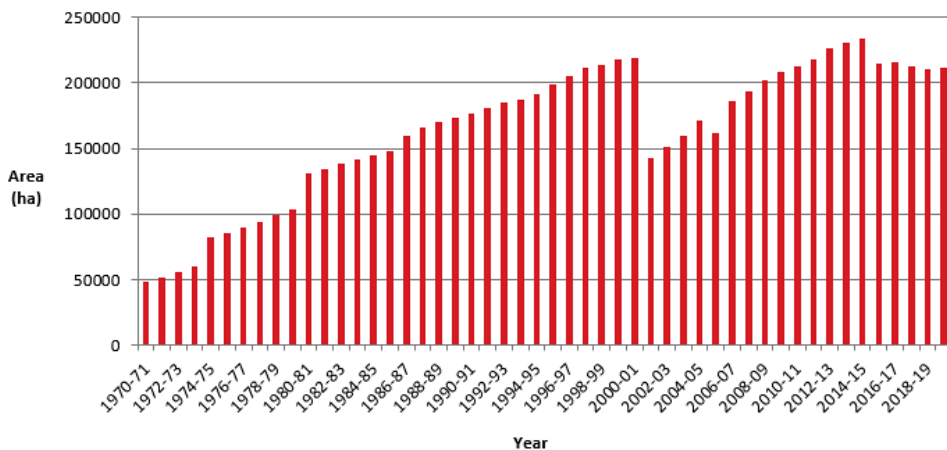
**Instability Index**

Instability analysis in the area, production, and yield has been studied using two measures of instability namely the Coefficient of Variation (CV) and the Cuddy Della Valle Index (CDVI). Instability in production is better measured by CDVI. A low value indicates low instability and vice-versa.

Therefore, CDVI corrects the C Vas:

$$CDVI(\%) = C.V (\sqrt{1-Adj.R^2})$$

where Adjusted R<sup>2</sup> is the coefficient of determination from a time trend regression that has been adjusted for its degrees of freedom and C.V is the coefficient of variation.<sup>9</sup>



**Fig. 1: Kashmir Valley: Area under major horticultural crops (1970-2020)**

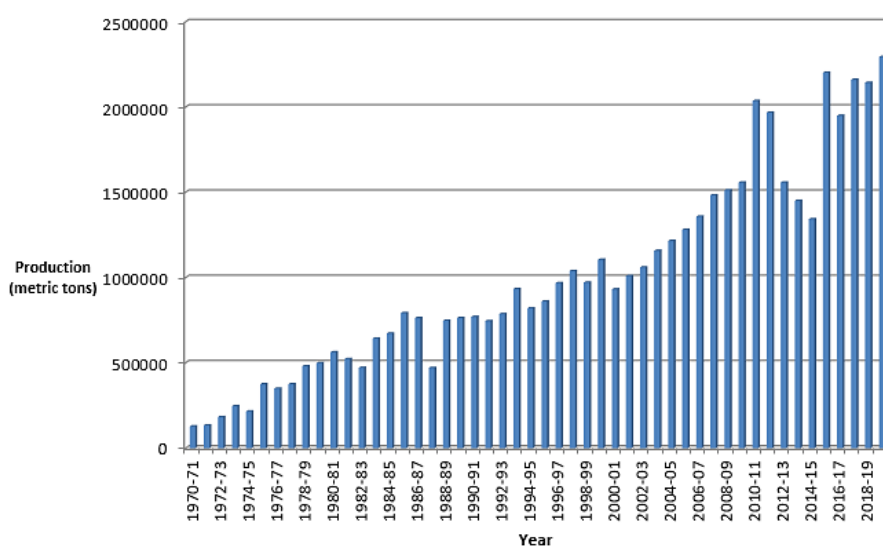
Source: Department of Horticulture., J&K; graph prepared by the first author

## Results and Discussion

The area under horticultural crops has increased with an overall positive growth rate, resulting in increased production but the rate for production is double. Yield has remained low and hovering around two to four tons per hectare for most of the time.

It is clear from Fig 1 that the area under horticulture in 2014-15 was at an all-time high i.e. 233954 hectares. In absolute numbers, the area under horticulture has increased from 1970 to 2020, but this increment has not been consistent. It has seen dips too, for example in 2001-02, the area under horticulture reduced to a figure that was two decades ago. During the first three decades of the study period, the area under horticulture has increased slowly and consistently.

At the start of the fourth decade, there can be seen a fall in the area under horticulture. Towards the end of the last decade of the study period, there can be a rise in total area under horticulture with an all-time high in 2014-15 in terms of absolute figures. From 2001 to 2010, apple was the one with the largest cropped area followed by walnut and almond. The least area occupying crops were citrus, olive, and grapes. From 2011 to 2020, apple was still at the top in terms of the area followed by the same crops as seen from 2001-10, but in the last decade (2011-2020), the least area occupying crops were not the same, as grapes gain area and become the highest growing crops in terms of area with a growth rate of 3.8 percent.

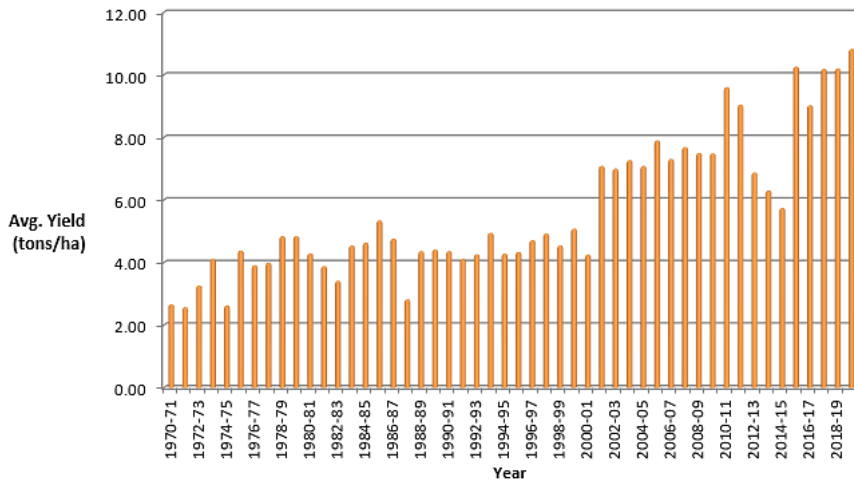


**Fig. 2: Kashmir Valley: Production of major Horticultural crops (1970-2020)**

Source: Department of Horticulture, J&K; graph prepared by the first author

Production has been the highest in the year 2019-2020. It can be seen that in all the decades there has been a continuous increase in the production of horticultural crops in absolute numbers. In 2014-15, a reduction in production led to its value being near to what it was a decade ago, the reason being the devastating Kashmir floods sweeping area under orchards causing heavy loss to the farmers. Despite such unpredictable weather conditions, production has shown a promising future by slowly recovering and gaining momentum in the latter half

of the last decade of the study period. In terms of production, apple has remained the crop with the highest production followed by walnut. Citrus, olive and other dryfruit crops are the crops with the least production. From 2001 to 2005, the area under olive increased from 10 hectares to 50 hectares but the reported production from olive is found to be zero. For the decade, the average area under olive was 49 hectares but average production has remained as low as 1 metric ton only.



**Fig. 3: Kashmir Valley: Production of major Horticultural crops (1970-2020)**

Source: Department of Horticulture J&K; graph prepared by the first author

Yield i.e. ratio of area and production, for the first three decades, has remained moving around 2 to 5 tons per hectare. With the onset of the fourth decade, it has shown a sharp increase, jumping from 5.08

to 7.09 tons/ha in 2001-02. Since then, it has been increasing till the end of the last decade with an all-time high of 10.82.

**Table1 : Kashmir Valley: CAGR of area and production of Horticultural crops**

	CAGR of Area		CAGR of Production	
	2000-10	2010-20	2000-10	2010-20
Apple	5.5	1.44	5.49	-9.49
Pear	5.49	-0.09	5.25	-1.3
Apricot	7.58	-10.05	18.37	-6.18
Peach	9.95	2.08	20.91	-4.34
Plum	5.55	-5.43	14.1	-4.59
Cherry	4.48	-4.28	6.12	-5.22
Grapes	3.5	3.82	7.57	2.5
Citrus	2.11	-8.3	1.08	
Olive	18.27	-16.36		22.53
Other fresh	12.77	-8.01	13.94	-18.06
Other dry	1.18	-26.94	0.31	-32.98
Walnut	4.68	-1.45	9.36	-3
Almond	0.49	-16.95	1.86	2.73

Source: Department of Horticulture, J&K; average calculated by the first author

The table 1 presents the Compound Annual Growth Rate (CAGR) for both the area and production of different fruit crops during two distinct periods—2000-2010 and 2010-2020. Notable trends emerge from the data. For instance, apple cultivation witnessed a decline in production CAGR from 5.49% to -9.49% between the two periods. Similarly, peach production experienced a decrease in CAGR from 20.91% to -4.34%. Apricot cultivation, on the other hand, showed a significant decline in area CAGR from 7.58% to -10.05%. Olive production demonstrated a remarkable reduction in area CAGR from 18.27% to -16.36%. Some crops, like grapes, maintained positive CAGR in both area and production over the observed periods. These CAGR values provide insights into the changing dynamics of fruit cultivation, indicating growth and stability across different crops and regions.

**Table 2: Kashmir valley: CAGR of Horticultural crops (1970-2020)**

Decade	Area	Production	Yield
1970-1980	9.66	17.33	7.02
1980-1990	3.36	3.64	0.24
1990-2000	2.48	4.12	1.62
2000-2010	2.21	6.03	3.75
2010-2020	-0.52	2.88	3.42
1970-2020	2.4	4.75	2.31

Source: Calculated by the first author

It is clear from table 2 that the CAGR for area, production, and yield has been the highest in the first decade. Then there are highs and lows in the decadal values of CAGR. The overall calculated CAGR of the area for the fifty years is 2.40 percent as shown in Table 2. That means in these fifty years, the area under horticulture has increased at a rate of 2.40 percent. Also, the growth rate for the area has remained positive for all the decades except for the last decade i.e. -0.52 percent. For the period from 2001-10, the olive has the highest growth rate i.e. 18.27 percent followed by other fresh fruit crops (12.77 percent) and peach (9.95 percent) as given in Table 1. The area under almonds is increasing at the lowest rate i.e. 0.4 percent though it is a crop with one of the highest areas. In this period, the growth rate for the area as well as for production has remained positive for all the crops. For the period 2010-2020,

the highest growth rate of the area was for grapes (3.82 percent), followed by peaches (2.08 percent) and apples (1.44 percent) according to the figures in Table 1. In this period, the growth rate of the area has become negative for many crops with other dry fruits (-26.9 percent), almonds (-16.5 percent), and olive (1.3 percent) leading to the negative growth rate chart. The CAGR for production has always been positive owing to the lower base of the preceding years. It has remained positive in all the decades, which shows that production is ever-increasing, compared to the area. The highest growth rate of production from 2000-2010 was for peach (20.1 percent) followed by apricot (18.3percent) and plum (14.1 percent) as given in Table 1.

The CAGR of yield has also remained positive for all the decades though the rate varies from high to low and vice-versa. Of all three variables, production has shown a higher growth rate than the other two.

The yield depends on production and the area sown under the crop. But production not only depends on the area sown but also on the technology adopted therein, entrepreneurship, and economics of production. With changing climate and unpredictable extreme weather, low returns, high input costs, and competition from the market are big challenges that will threaten the production and area forcing farmers to other high return stable sectors.

**Table 3: Kashmir Valley: Trends in Area of Horticultural crops from 1970-20.**

	Mean	C.V.	CDVI
1970-80	76954	27.08	6.46
1980-90	150751.70	10.21	10.03
1990-2000	196758.40	7.44	0.86
2000-10	218564	14.42	13.86
2010-20	179515.99	3.92	3.80

Source: Calculated by the first author

In 1970-80, the area under horticultural crops was the lowest of all the decades as these were the initial years. Also, the instability was low but statistically significant. So, in the next decade 1980-90, the area started increasing at a rate of 3.38 percent with moderate instability. This increase was simply because fruit crops were bringing more money than food crops. Also, in this decade, to increase quality

and productivity, SKAUST was established in 1982. This university has made a substantial contribution to research and technology by giving new varieties of agro-technologies. In the next decade, 1990-2000, the area increased but at a decreasing rate as shown in Table 2. Lower fluctuations and enhanced farmer adaptability for the crops were demonstrated by lower instability. The area under the horticultural crops was the highest in 2000-10 with high instability. In the last decade, the area has shown negative growth. Instability was low in the decade 2010-20. Overall area in all the decade had shown an increasing trend except the last where it had entered into the negative territory. Also, during the study period, every decade of low instability was followed either by high or moderate instability.

**Table 4: Kashmir Valley: Trends in production of horticultural crops (1970-2020)**

	Mean	C.V.	CDVI
1970-80	298775.60	45.5	11.74
1980-90	641063.30	19.65	17.26
1990-2000	900225.70	13.56	6.16
2000-10	1256895.40	17.50	1.61
2010-20	1910511.95	17.69	16.41

Source: Calculated by the first author

As depicted in table 4, in 1970-80, production was 29887.60 metric tons with high instability which is statistically significant, since then it has been increasing positively but with a fluctuating rate given in Table 2. This variation is brought on by a changing environment, less precipitation, early flowering due to higher temperature and everything getting wilted as a result of inadequate moisture. After 1970-80, the growth rate of production was the highest in 2000-10 and during the same period, the instability was the lowest as per table 4 which was statistically significant as well. During 2010-20, the production was the highest as can be seen in table 4. The introduction of improved technology and high-density seeds has contributed to increasing production in this decade. The decade 1980-90 is with the highest instability (CDVI) as per table 4. Except for 2000-10, instability had been moderate to high and very high. It is clear from Table 2 and Table 4 that whenever the growth rate of production has gone up, instability has gone down.

**Table 5: Kashmir Valley: Trends in yield of horticultural crops (1970-2020)**

Year	Mean	C.V	CDVI
1970-80	3.72	23.84	13.93
1980-90	4.24	16.85	17.82
1990-2000	4.55	7.458	5.98
2000-10	7.06	14.53	11.72
2010-20	8.8	20.79	19.29

Source: Calculated by the first author

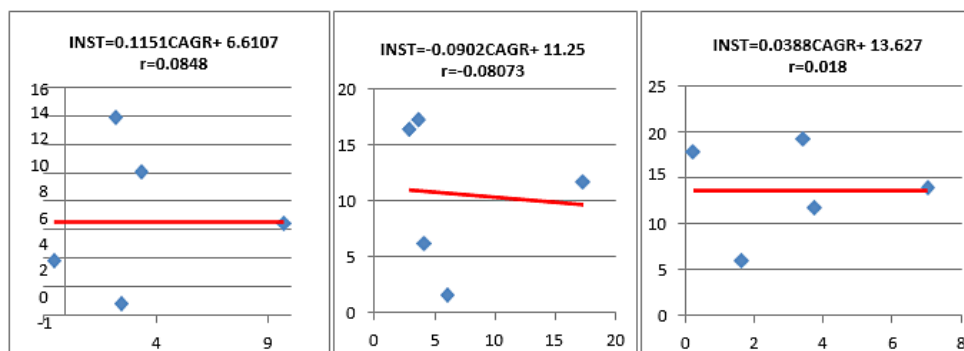
Throughout the study period, the average yield has increased decade by decade but has remained quite low as can be seen in the table 5. Local farmers in the valley claim that despite several advances in agricultural technology, the majority of them still employ the same farming practices. Additionally, they have been growing the same horticultural crop variety for years. This is one of the reasons of low yield. Instability in yield was mild between 1990 and 2000. Yield is a ratio of production and area, so it varies according to the variation in these two. The remaining decades all display moderate to high and extremely high instability. C.V is slightly higher than CDVI which shows that CDVI is a more appropriate method to analyze instability than C.V. as it exaggerates instability a bit sometimes.

Horticultural crop growth rates for area, production, and yield, as well as coefficient of variation and CDVI in each of these metrics, were examined to provide a comprehensive picture of the development and sustainability of crops. Area and output showed the greatest rise in absolute numbers among all the criteria from the first to the last decade of the study period, although the yield wasn't very outstanding.

**Table 6 :Kashmir valley: Regression model between growth and instability and horticultural crops**

Parameter	1970-2020
Area	INST = 0.11CAGR+6.6
Production	INST = - 0.09CAGR+11.2
Yield	INST=0.0388CAGR+13.62

Source: Calculated by the first author



**Fig. 4: Kashmir Valley: Scatter plots showing the relation between growth rate (of area, production & yield respectively) and instability**

Source: Prepared by the first author

It is clear that for every unit increase in CAGR, instability in the area increased by 0.1151. For every unit increase in CAGR, there was a decrease of 0.0902 in production instability which means if production increases, instability declines and vice-versa. For every unit increase in yield, there was an increase in instability by 0.0388.

It is clear from the scatter plot that there is a negative correlation between the growth rate of production and instability which indicates that when instability declines, the growth rate increases and vice-versa. For area and yield, the correlation is positive but not very significant. During the period 2000-10, the area under apple crop and production increased almost with the same growth rate. The same goes with pear and cherry which have seen near to the same rate of production and growth. Apricots, peaches, and plums have also seen growth in area and production, where the growth rate of production is double the rate of increase in area. According to the data obtained from the Department of Horticulture, J&K, the average area under citrus and olive is 41 hectares whereas the average production is only 4 metric tons which is very low.<sup>1</sup> During the period 2010-20, apples, grapes, and peaches had positive growth rates in the area; the growth rate of other fruits was negative. For production, Almonds, olives, and grapes have positive growth rates, and all other fruits have a negative growth rate. For this decade, only grapes have a positive growth rate both for the area and production.

**Table 7: District-wise average area, average production and average yield under major horticultural crops (2009-19)**

District	Area(ha)	Production (MT)	Yield (MT/ha)
Srinagar	5336.72	30530.64	5.72
Ganderbal	12922.09	81854.91	6.33
Budgam	27152.18	137546.20	5.06
Baramulla	30060.90	498410.30	16.58
Bandipora	7228.63	63564.91	8.79
Kupwara	27688.35	264180.90	9.54
Anantnag	33398.05	450357.40	13.48
Kulgam	23938.11	191088.10	7.982
Shopian	26157.78	255662.70	9.77
Pulwama	23739.90	152349.80	6.41

Source: Department of Horticulture, J&K

It is clear from table 7 that from 2009-2019, the average area under horticulture was the highest in Anantnag and Baramulla and was least in Bandipora and Srinagar. The highest production comes from Baramulla and Anantnag and the least from Ganderbal, Bandipora, and Srinagar. Srinagar is a city area, so less land under such activities but its lowlands are fertile and devoted to rice cultivation and in the case of Ganderbal, it too has tracts of alluvial soil dedicated to rice cultivation. In general, horticulture is practiced in hilly areas whereas low lands of the valley are dedicated to agricultural crops.



The highest yield comes from Anantnag and Baramulla whereas Budgam and Srinagar are the districts with the lowest yields. Anantnag and Baramulla are districts with more area under agriculture and horticulture. Also, the soil mainly found here is brown earth or brown forest soil. This type of soil is mostly utilized for growing fruit crops along with other crops. Karewas soil is dominant in Anantnag and Baramulla which is excellent for fruit cultivation. The area is one of the main factors for the production of fruit crops, the productivity of fruit crops is also influenced by its area. The land area in Anantnag and Baramulla is naturally favorable for horticultural crops. Though compared to other districts of the valley, yield is high but low if compared with the national average. Srinagar is a city area and hence less area under agriculture and horticulture. The contributing factor to low yield is the low-yield variety of plants used by farmers and traditional methods of farming.

### **Recommendations**

Reviving old abandoned orchards in the Kashmir Valley can boost horticulture production and have several economic, cultural, and environmental benefits for the region. It involves surveying and assessing the orchards, pruning the trees, and introducing new varieties through grafting. Proper irrigation and fertilization are crucial, and regular monitoring for pests and diseases is necessary. Harvesting and marketing strategies should be implemented once the orchards start producing fruits. Reviving these orchards can lead to increased yields of fruits and nuts, preserving traditional fruit varieties, and creating job opportunities and income for the local economy. Moreover, it can have positive environmental impacts, such as reducing soil erosion, improving soil fertility, and providing habitats for wildlife.

Farmers can be trained on modern irrigation systems, crop diversification, weather-resistant crop varieties, and sustainable farming practices to reduce the environmental impact of farming and preserve natural resources. The campaigns can also provide information on financial assistance programs and subsidies to facilitate farmers' access to credit facilities for investing in modern farming technologies and equipment. Additionally, promoting climate-smart practices such as rainwater harvesting, composting,

and soil conservation can improve soil fertility, reduce water usage, and help farmers adapt to the changing climate, leading to higher yields and improved sustainability. Ultimately, the awareness campaigns can empower farmers to adopt new and efficient farming practices that are well-suited to the changing climate, resulting in increased horticulture production in the Kashmir Valley.

Moreover, it is essential to introduce new plant varieties and improve market facilities, including an increase in the number of mandis. The introduction of new plant varieties can increase yield, quality, and resistance to pests and diseases, while improved market facilities can provide farmers with better access to markets and increased sales and profitability. With the increase in the number of mandis, farmers can sell their products directly to consumers, processors, and exporters, reducing intermediaries and earning better prices. This can encourage farmers to produce high-quality products and invest in modern farming techniques, ultimately leading to increased horticultural production. The increase in the number of mandis can improve the efficiency of the marketing system by reducing transportation costs, minimizing wastage, and providing farmers with information on market trends and prices.

Further, implementing an import duty on cheaper fruits and nuts can benefit local farmers in the Kashmir Valley. It can create a level playing field for them to compete and receive fair prices for their products. The import duty can promote the consumption of locally produced fruits and nuts, leading to increased demand, better prices, and higher horticultural production. Additionally, the revenue generated from the import duty can be used to support local farmers through various schemes and subsidies.

These measures can provide farmers with better access to markets, and higher profits, and encourage investment in modern farming techniques resulting in increasing yield, improved quality, and profitability.

### **Conclusion**

In all the decades of the study period, the growth rate of production and yield has remained positive except for the area in the last decades. Some crops like

apples, walnut, and almond have occupied a major share of the area, and production has also started to show negative trends in the last sub-period. One of the listed problems with these crops, for example, apples is that they have bumper production which means reduced prices in the market. So, farmers usually prefer to store their products in cold storage to sell them in the off-season to earn profit. In Kashmir, this storage facility is not up to mark. UT's cold storage capacity is merely two lakh metric tons, but only the production of apples stands out to be twenty-five lakh metric tons every year. This speaks volumes about storage capacity leaving most of the farmers to sell their produce at lower prices to save them from getting perished. Also, the harvesting period of Iranian apple and Kashmiri Apple coincides, and cheaper Iranian apple in the Indian market gives competition to local farmers. Changing market dynamics also contribute to growing less of a crop if it requires more inputs and does not give the desired economic output. Other crops like olive and citrus, which occupies less area and produce even less or not. The reported production of olives is zero in some years. Fairly conclusion, horticulture in Kashmir has long survived, flourished, and elevated the economic life of people owing to its favorable climate-geographical conditions. But its true potential is still untapped. Not only major crops, but other crops also hold the potential. They require equal attention to benefit the farmers, for they could generate extra income for them.

Therefore, the opportunity lies in the fact that the growth rate of production has remained positive in all the decades, and with the intervention of the government to educate farmers with the necessary changing market-oriented skills and give some subsidies on the crops not producing according to the area they occupy will create a scope for the expansion of this sector and will give a boost to the economy thus employing more people and creating jobs.

The first challenge lies in low yield, although its rate was positive throughout the study period. It is very low reaching from just 2 to 10 tons per hectare in fifty years. Also, the changing climatic patterns have posed a big challenge like early snowfall damaging the flowers of the fruit before they reach their mature stage. So, the effort the farmers are putting

in is not getting fully rewarded. It may dismay their high hopes coming from the benefits they expect and shift their focus on high-returning economic activities. It may upset the production of fruit crops in the coming years as the area has already been shrinking slowly. Sustaining the positive growth and reviving the small fruit crops like olive and other citrus crops to contribute towards the production with the existing resources will be a challenge in the coming years. Various schemes on the ground level to fully show their results will require a lot of time but it is a positive step towards it. For example, the Mission for Integrated Development for Horticulture (MIDH-CSS) is a scheme to rejuvenate horticulture through area expansion, mechanization of horticulture, the revival of old orchards, etc. The pictures of horticulture whether promising or else will be clearer in the coming years.

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**Conflict of Interest**

We, the authors of the research paper titled " Horticulture In Kashmir Valley: Opportunities and Challenges" hereby declare that we do not have any conflicts of interest that could potentially influence the objectivity, methodology, results, or interpretations presented in this research paper. We confirm that:

We have no professional interests that might compromise the integrity of our work.

We affirm that this research has been conducted in a transparent and unbiased manner, adhering to the highest ethical standards of academic research. Our methods, analysis, and interpretations have been carried out objectively and rigorously. We are fully committed to upholding the credibility and reliability of the findings presented in this research paper.

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