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Ruyida Mushtaq, Rajesh Yadav and Harmeet  
Singh

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## Growth Performance of Temperate Pear Production in Kashmir Valley, Jammu & Kashmir, India

Ruyida Mushtaq<sup>\*1</sup>, Rajesh Yadav<sup>2</sup> and Harmeet Singh<sup>3</sup>

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### ABSTRACT

Horticulture plays a crucial role in Jammu and Kashmir economy which is not only important from the viewpoint of potential income generating activities but also contributes to the GDP of the Jammu and Kashmir economy. Pear is a horticulture crop in temperate region of Kashmir valley which provides different value-added products and ensures sustainable development of the region. The high production of pear crop in Kashmir valley is due to its favourable agro-climatic conditions and topography of the region. The present study has been obtained from secondary sources of data which aims to explain trend of area, production and productivity of pear cultivation in Kashmir valley from 2004-05 to 2017-18 for a period of 14 years. The results observed that trend of area and production under pear cultivation has witnessed considerable increase from year 2004-05 to 2017-18. The trend is explained in the compound annual growth rate of area and production which has witnessed an increase at the rate of 2.65 and 6.14 respectively during last one decade. The productivity shows signs of decreasing trend at rate of 0.85 from year 2004-05 to 2017-18. Therefore, supply chain management and effective government intervention along with development strategies of pre- and post-harvest techniques is required to improve productivity of pear crop.

**Key words:** Pear, Horticulture, Kashmir valley, Compound annual growth rate

The word horticulture has been derived from the Latin word 'Hortus' meaning garden and 'Colere' meaning to cultivate. It includes the study of cultivation of fruits, vegetables and flowers, spices, medicinal, aromatic plants. India is the largest producer of horticulture crops after China accounts 13% of the global production of fruits and 21% of vegetables [1]. Jammu and Kashmir has abundant diversity due to geo-ecological conditions, which is conducive to the growth of temperate horticultural crops including apple, pear, peach, plum, apricot, almond, cherry, saffron and Zeera are cultivated in some regions of Jammu and Kashmir [2]. Horticulture contributes to the Jammu and Kashmir economy which depicts increasing trend of horticulture crops in Jammu and Kashmir and has shown a tremendous growth with 11000 metric tons of production in 1950 to 26 lakh metric tons of production in 2020 [3].

Horticulture generates livelihood opportunities for

marginal farmers and other value chain participants and has great potential to contribute Sustainable Development Goals which led to sustainable development of region [4]. Horticulture sector contributes in poverty alleviation, nutritional security that plays an important role in contributing economic and ecological development which sustains agro-based industries and generates livelihood opportunities [5]. For horticultural production the demand per capita continue to increase with improved income generation, standards of living, and health including indigenous vegetables, fruits, and flowers respectively used for culinary, salad, and ornamental purposes, also known for their medicinal and nutritive value thereby having increased demand from rapid population increase and facilitated by trade agreements and emergence of an international horticultural market [6]. In the temperate horticulture sector, pear crop is a profitable product and ideal value chain which ensures sustainability of a region [7].

In developing countries there has been an increase in exports over recent decades since 1980 [8]. China ranks second leading in the world as an exporter of processed vegetables and fourth for unprocessed vegetables in 2005 [9]. Around the world, in 2010 nearly 605 million tons of fruit, 10 million tons of tree nuts, and more than 1.8 billion tons of vegetables were produced [10]. China is one of the leading producer and exporter of pears in the world [11]. The countries with the highest levels of pear per capita

\* Ruyida Mushtaq

✉ ruyidakhan611@gmail.com

<sup>1,3</sup> Department of Geography and Disaster Management, University of Kashmir, Hazratbal-190006, Srinagar, Jammu and Kashmir

<sup>2</sup> Department of Geography, Mohanlal Sukhadia University Udaipur, Rajasthan, India

consumption in 2019 were Argentina, Italy and China and led by increasing demand for pear worldwide, the market is expected to continue an upward consumption trend over the next seven years. China is the leading position in pear production, generating 17 million tonnes of fruit, followed by United States, Argentina, Italy and Spain [12]. In India, Pear is mainly cultivated in north eastern regions including Himachal Pradesh, Jammu and Kashmir, Punjab Uttar Pradesh, and also grow in subtropical regions. Therefore, conducting a research study on this theme is not only significant from the prism of sustainable livelihood but also contributes to the Gross domestic product (GDP) of the union territory of Jammu and Kashmir. The main objective of the study was to find out trend of area, production and productivity of pear crop in Kashmir valley for time period, 2004-2018.

MATERIAL AND METHODS

Kashmir valley is the transverse valley in union territory of Jammu and Kashmir which is situated between 33° 25' to 34° 30' N latitude and 73°55' E to 75°35' E longitudes. It is nestled between Pir Panjal and Greater Himalayan ranges, about 150 km long and 35-55 km broad. Its floor situated in the Jhelum flood plain is 5200 ft above sea level. Mostly people in Kashmir valley are involved in Agriculture activities. Horticulture sector plays a significant role to Kashmir economy and is a major source of sustainable livelihood. The tremendous potential of J & K in horticulture due to its agro-climatic conditions making it a major export industry. The study area map is depicted in (Fig 2).

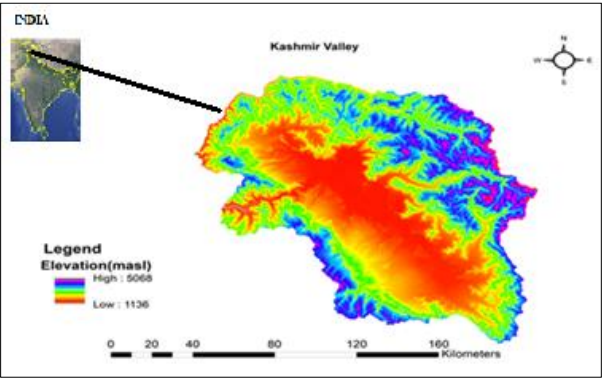


Fig 2 Location map of study area  
Source: Shutter Radar Topography Mission, SRTM-30m resolution

The present study is based on secondary data sources collected from Directorate of Horticulture, Jammu and Kashmir, Economic survey 2018-19, Statistical Digest and Food and Agriculture organization report. To analyze the area, production and productivity of pear crops from 2004-2018, the Compound annual growth rate was used by utilizing the time series data available between 2004-2018. Pear crop wise area in hectares, Production and productivity of pear crop in metric tonnes for a time period of 14 years from 2004-2005 to 2017-2018 can be evaluated by measuring growth in area, production and productivity of pear crop in Kashmir valley.

The compound annual growth rates (CAGR) of area under pear, production and productivity of pear are computed using the exponential growth function. The formula of function used is:

$$Y = a b^t$$
$$\text{Log } Y = \log a + t \log b$$

Compound growth rate formula adopted by Green and were calculated by using the following formula:  
The compound growth rate in percent = {antilog of (logb) – 1}×100

Where;  
CGR = Compound growth rate  
t = time trend, denoting years  
y = Area/ production / productivity  
a & b = Regression parameters

RESULTS AND DISCUSSION

The focus of the study is centered on the pear crop area, its production and productivity in Kashmir valley. Pear cultivation in western Himalayan region of Kashmir valley has witnessed a tremendous growth during last one decade in union territory of Jammu and Kashmir. In Kashmir valley, area of pear cultivation has increased from 4270 hectares in 2004-2005 to 6164 hectares in 2017-2018. The perusal of (Table 1) reveals that area of cultivation of pear has annual compound growth rate of 2.65% from 2004-2005 to 2017-2018 showing tremendous growth of pear area. The production of Pear crop has also increased from 22125 metric tons in 2004-2005 to 50975 metric tons in 2017-2018. The annual compound growth rate production of pear cultivation is 6.14%. The growth in production of pear is due to expansion of area under pear cultivation rather than productivity. The productivity shows signs of decreasing trend from 5.1 metric tons in 2004-2005 to 4.8 metric tons in 2017-18. The productivity of pear cultivation has an annual compound growth rate of 0.85 percent which depicts in table 1 and shows signs of stagnation of the pear yield.

Table 1 Compound annual growth rate for Pear with respect to area, production and yield from 2004-2005 to 2017-2018

Variable	CAGR (%)
Area of pear	2.65
Production of pear	6.14
Productivity of pear	0.85

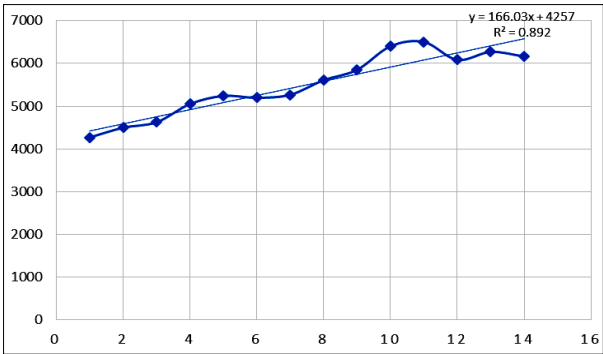


Fig 3 Trend in area under pear in Kashmir valley from 2004 to 2018 in hectares

The remarkable growth of pear production in Kashmir valley is due to introduction of high-density plant varieties of pear that boosts production of pear crop in western Himalayan region of Kashmir valley [13]. There has been large scale conversion of agricultural to horticulture land in Kashmir valley due to high economic returns in horticulture [14]. The yield of pear crop in Kashmir valley

has seen decreasing trend which is correlated with unfavourable climatic conditions and erratic rainfall patterns [15]. Low yield of pear crop in Kashmir valley is due to short shelf life especially that of the Babgosh variety of pear

crop. Inadequate agriculture practices, inefficient preharvest and postharvest strategies, lack of awareness and technology in horticulture are reasons responsible for low yield of horticultural crops in Kashmir valley.

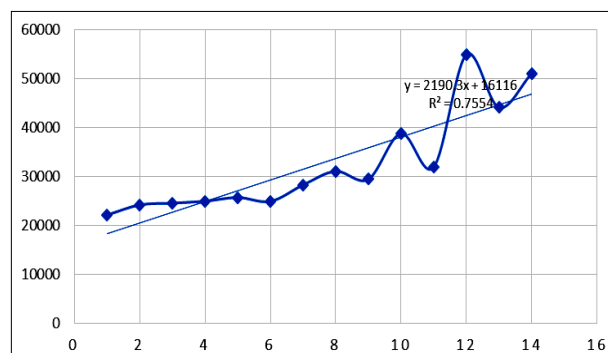


Fig 4 Trend in production of pear from 2004 to 2018 in metric tonnes

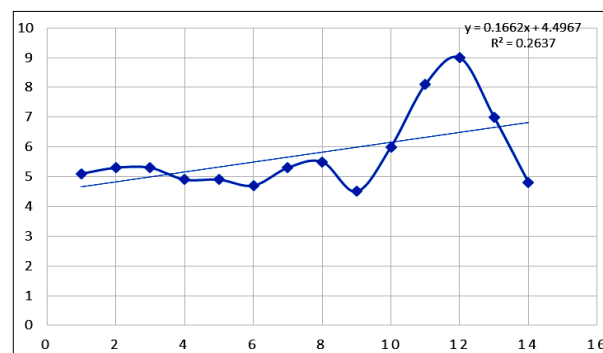


Fig 5 Trend in productivity of pear from 2004 to 2018 in metric tonnes

## CONCLUSION

Pear cultivation in Kashmir valley has witnessed positive growth both in term of area and production of pear crop during the last one decade. Yield of pear crops shows decelerating trend due to unfavourable climate conditions, lack of preharvest and postharvest techniques. Horticulture has the tremendous potential to provide viable and sustainable livelihood opportunities perfectly aligning with the National Goals and the sustainable development goals of United Nations in poverty alleviation and inclusive sustainable development. Horticulture supply chain management and human resource development is required at both pre-harvest and post-harvest strategies which should be

addressed simultaneously. Supply chain management and collaborations improve productivity and efficiency of crops which play an important role for achieving sustainable livelihood and agriculture.

## Conflict of interest

The authors confirm that this article content has no conflicts of interest.

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