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IMPACT OF CLIMATE CHANGES WITH SPECIAL REFERENCE TO WALNUT PRODUCTION IN JAMMU AND KASHMIR

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ABSTRACT

The climate change effects on ecosystems severe, extensive and most frightening challenges to the food security of humankind. A number of problems are rising gradually with related to the climate changes and there urgently required to take some actions for the agricultural sustainable production. In agricultural activities the climate change deeply impacting the conditions of every part of the world such as animals, plants and ecologies, which are following existing climatic conditions and impacts to the different fruit production. Different elements are impacting in different ways to the stone and poem fruits like walnut, apple, apricot, almond etc, which are becoming high costly to grow, and faces hard to grow in several places. Due to the increasing temperature in winter season, spring frost, hailstorms, droughts, snowfalls at the flowering times of fruits and unusual rains destroying the production level of walnut, almond, apple, plum etc. The easy blossom and increase the production of walnut require a good number of hours with winter chill or cold temperature. The extensive climatic changes become more difficult to the world in cultivating the walnut fruits and smaller quantity yields of walnut impacts to the development of the cultivators and associated with this industry. This study used secondary source of key literature and objectives of the study are to discuss the impact of climate changes and its problems on walnut production with special references to Jammu and Kashmir.

Keywords: Climate Change, Ecosystems, Humankind, Destroying, Walnut Production

1. INTRODUCTION

In 21st century the climate changes has a greatest relation with the mankind. Due to abnormality of climate changes the well-known marketable varieties of fruits, flowers and vegetables carry out poorly in an unpredictable performance. In the Himalayan regions melting of ice lid reduce

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the chilling effect needs for the flowering of several horticulture crops such as walnut, apple, almond, orchid, saffron etc. walnut production plants mostly grown open field environments and affected severely due to high temperature, drought and unusual rainfall etc. Furthermore, air pollution significantly reduced the productivity of walnut with other various horticultural crops and raises the strength of certain physiological disorder such as black tip of mango. That's why there is required to protecting walnut and such precious crops for sustainability in opposition to the climate change situation. The most successful way is to take on conservation agriculture, forest and water conservation, using renewable energy, reforestation etc. To maintain the yield, changes of present practices of horticultural and larger use of greenhouse technologies are a quantity of the solutions to diminish the effect of climate change. Increase of new production methods of walnut crops tolerate to the high temperature, anti to pests and diseases, short period and producing good productivity under strain conditions, with adoption of careful management of natural resources and hi–tech horticulture practices will be the core strategies to convene the challenge. In walnut trees there have a number of threats in cultivation related with climate change and becomes means of danger to the spring frost, water shortage, hailstorms and longer droughts and flowering full crop of the walnut.

2. METHODOLOGY

The present study is based on secondary sources of data. The data has been collected from different published and unpublished sources such as papers, journals, Govt. records, reports and other sources. The objectives of the study are to discuss the impact of climate changes on the walnut production and its problems with special references to Jammu and Kashmir.

3. KEY LITERATURE

Datta. S (2013) showed the impact of climate change in Indian horticulture- a review. In the study the author explained different problems in the production of horticulture fruits such a walnut, apple, apricot etc and discussed the importance of the expert horticulturists to protect the fruit industry from the climate changes in a proper way. The proper effective method is to follow agriculture conservation, appropriate renewable energy using, water and forest conservation etc to maintain the modification of walnut productivity with the use of green house technology to protect from the climate changes.

Kumar and Kumar (2007) demonstrated impact of climatic changes on the various commercial horticultural products like walnut, apricot, apple and cherries. The study pointed out different means of climatic changes such as dry spells of rains, delay in monsoon, supraoptimal temperatures in flowering and fruit growth, inappropriate rains in water stress time, hailstorms,

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atmospheric temperature and variation in pattern of rainfall are effects to the pome and stone fruits. The yield of various horticultural crops effected due to the high air pollution.

Lal and Ahmed (2014) portrayed the deep picture of the strategies to Minimize Impact of Climate Change on Fruit Production. In this study different fruit crop production effected due to the many factors of the environmental, biological and physiological modifications. The environment strange changes playing a vital role like droughts, erratic rains, snowfall, hailstorms and increasing temperature etc consequential in change in the fruit production. The climate changes are affecting the quality and production of the horticulture crops. The results of such fast changes are change of seasonal pattern, melting of ice cap, excessive rains, global warming, flood, drought etc which decreases the potential capacity of the fruit production. Noble Laureate Pachauri said the climate changes shrinked the production land which is not suitable for the sustainable production for long time and become major threat to the food security for a country like India.

Muller Markus and Braun Peter (2012) studied the impact of climate changes on fruit production. The study showed the reaction of the plants change in the environment and outcome of the climate variables. The fruit trees have a lot of threats in the production time due to the climatic changes which increases the risk of spring frost, risk of pests and diseases, hailstorms, water scarcity and droughts in the main time of production. In spring period start flowering and full flowering is the dangerous stage for the production of the fruits due to the unusual rains and frosts.

4. IMPACT OF CLIMATE CHANGE

In Jammu and Kashmir temperatures are increasing, with major increase of temperature in maximum level is 0.05 Celsius ever year. In Kashmir region average mean temperature has risen 1.45^0 in past 28 years and 2.32^0 Celsius rise in Jammu region. Thus temperature rise and rainfall decline, the walnut apricot etc are fast failing from several parts of the Kashmir. Because of general increase temperature and fewer availability of water deteriorating the production and quality of walnuts in Kashmir valley and in Jammu region in mid temperature. In Kashmir production and productivity grows very slow in rain-fed areas of Kashmir's Karewas because of abnormal windstorms and hailstorms in summer to different fruits like walnut, apricot, plum, apple and cherry are getting damage greatly. In latest years the style varies in Kashmir with snowfall pattern which affects all the stone and pome fruits. In so many years it has observed that flowering and snowfall are losing quantity and quality in great level. In Jammu and Kashmir, the area under walnut production has reduced with drastically due to high temperature and less rainfall in winter. These causes big problem of chilling necessity which is significant to quality and higher production of walnut

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4.1. EFFECTS ON SPROUTING

Mostly walnut and apple are impacting due to the change of temperature where trees grow 2-3 weeks before but usually walnut trees grow in April. In mid march majority of trees began to open their buds. In March end, it becomes unusual extremely cold again and vulnerably to frost damage to the open buds. Due to these climatic changes, walnuts colour, taste and growing levels highly changes.

4.2. EFFECT ON CHILLING NECESSITIES

The majority deciduous fruit trees require adequate accumulated chilling, or vernalisation to shatter winter dormancy insufficient chilling due to improved greenhouse warming may result in extended dormancy, leading to decreased fruit quality and productivity. The low down warming situation is less than 1 °C is not likely, to affect the vernalisation of high-chill fruits like walnut, apple, apricot, cherry, almond varieties and if warming situation go over's 1.5 °C and would considerably raise the risk of extended dormancy for both pome-fruit and stone-fruit.

4.3. EFFECT ON INCIDENCE OF PEST, INSECT AND DISEASE

Erratic variation in temperature and rainfall, guides to more incidences of pests, insect and diseases. In the previous some years, the attack of walnut scab, powdery mildew in walnut, flee beetle in approximately all the fruit crops has been enlarged.

5. WALNUT PRODUCATION IN JAMMU AND KASHMIR

Walnut is belongs to the family of (Juglandaceae). The origin and history is from Iran and the areas surroundings it. The walnut production favor temperate climate structure otherwise its trees are damaging in the cold winters and bloom flowering with immature nuts injures due to the spring frosts. In walnuts there is wind –pollination and different verities are planted in one orchard with close proximity. In Indian different states, walnut is cultivated but earlier it was found in Jammu and Kashmir. Where more than 92 percent of walnut production is exports to the Indian different markets and outside? Walnuts are high in proteins, minerals and fats and good sources of energy. It is utilize for the purpose of pickles, fresh juices chutneys, syrups and has tremendous flavor and consumed as a dry fruit. On the basis of commercially, it is utilized for groundwork of bakery products, ice-creams, chocolates, oils, ornaments and confectionary and salad products. Walnut is used instead of the medicine to remove different chronic disease like cancer, heart disease, main power weakness, etc. its shells are applied glue for the cleaning and polishing surfaces. There are different verities of walnut are producing in various places like Black More, Tutle-31, Hartley, Serr, Franquette, Vina, Ashley, Tutle-16 and Howard are grown. In India walnuts have different size and shape and have categorized into main four shells, paper,

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thin, medium and hard and has classified in different size and shell cracking rate such as, Indian special light half, light broken, light pieces, light crumbs, light my-fire, light amber halves, light amber broken and light amber pieces. Its production is cyclical and shows the fluctuation trend year to year due to the climate changes. The Jammu and Kashmir state cultivated the walnut about 86,263 tones within area 61,723 hectares in 2013. Walnut production is general in Anantanag, Kupwara, Kalgan, Baramulla, Budgam, Srinagar, Poonch, Badarwah, Ganderbal, Bandipora, Rajouri and other hilly areas.

TABLE 1: AREA AND PRODUCTION OF WALNUT CULTIVATION IN JAMMU AND KASHMIR

S. No	Year	Total Area	Area of Walnut Cultivation	Total Production	Area of Walnut Production
1	2001-2002	221589	61782	1097208	86263
2	2002-2003	231727	66340	1146587	90032
3	2003-2004	242546	69182	1273813	94579
4	2004-2005	258311	74894	1331861	100596
5	2005-2006	268284	77226	1412992	109167
6	2006-2007	283085	81393	1504011	114926
7	2007-2008	295141	82045	1636203	146781
8	2008-2009	305621	84558	1689842	147642
9	2009-2010	315089	87280	1712409	165024
10	2010-2011	325133	89788	2221990	163745
11	2011-2012	342791	83613	2161169	208738
12	2012-2013	347223	93641	1742142	209051
13	2013-2014	355921	94899	2117299	227541
14	2014-2015	359089	96397	1542676	181443
15	2015-2016	337677	88900	2493999	266133
16	2016-2017	338528	89339	2234980	266280

Source: Directorate of Horticulture Kashmir/ Department of Horticulture (Various Years)

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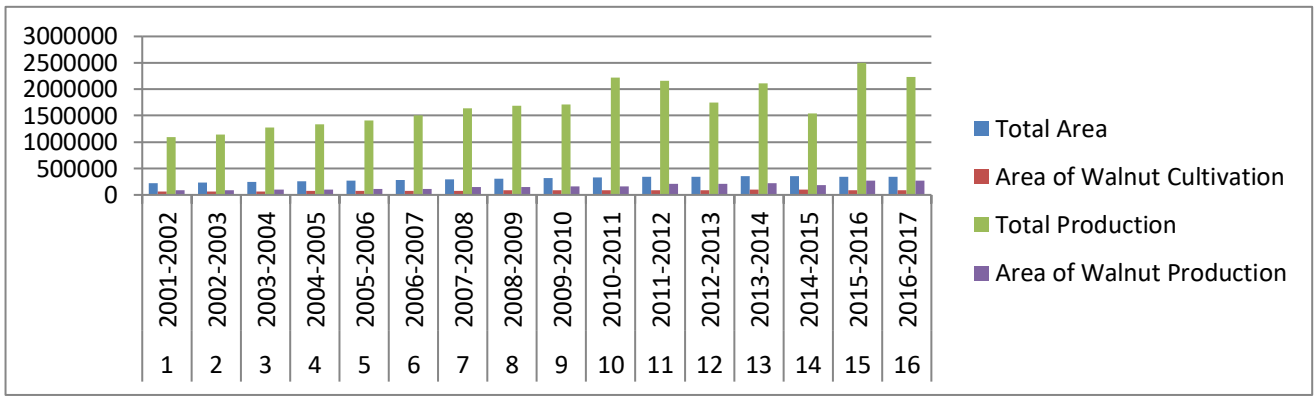
CHART 1: AREA AND PRODUCTION OF WALNUT CULTIVATION IN JAMMU AND KASHMIR



Source: Directorate of Horticulture Kashmir/ Department Of Horticulture (Various Years)

6. SHARE OF WALNUT PRODUCTION FROM JAMMU AND KASHMIR

India is based on agricultural and its 70 percent of population are directly and indirectly associated with it. In agricultural sector horticulture plays vital role in the production of different kinds of crops and fruits. In India Jammu and Kashmir is the major famous producer of walnut and apple and its average share is increasing in Indian's total aggregate production. India is the eighth 8th biggest producer of walnut in the global level and Jammu and Kashmir is the state in the country which shares 92 percent of the production. The state enjoys as monopoly producer of walnut, Pears, Almonds etc with greater advantages. Nearly 75 percent of temperate fruits in India are grown in the state. The walnut production about 86,263 tons from an area of 61,723 hectares and exporting 92 percent of walnut and 77 percent of apple from Jammu and Kashmir. The state declared as the "Agri. Export Zone for Apples and Walnuts. A consumption and trade of walnut represent an important industry to improve income growth and employment in Jammu and Kashmir. The export of fruits is the foundation of the Jammu and Kashmir economy. The state is the major producer and exporter of walnut and its international market share is about 7 percent during 2015.

Walnuts are sells in two forms in-shell Walnuts (without shell) and shelled Walnuts (with shell) in different Indian markets. It is estimated that in India 50-60 percent of Walnut is domestically consumed and half of it is used during festive seasons with near 10 percent of it is used for the preparing the bakery, ice-creams and confectionary purposes.

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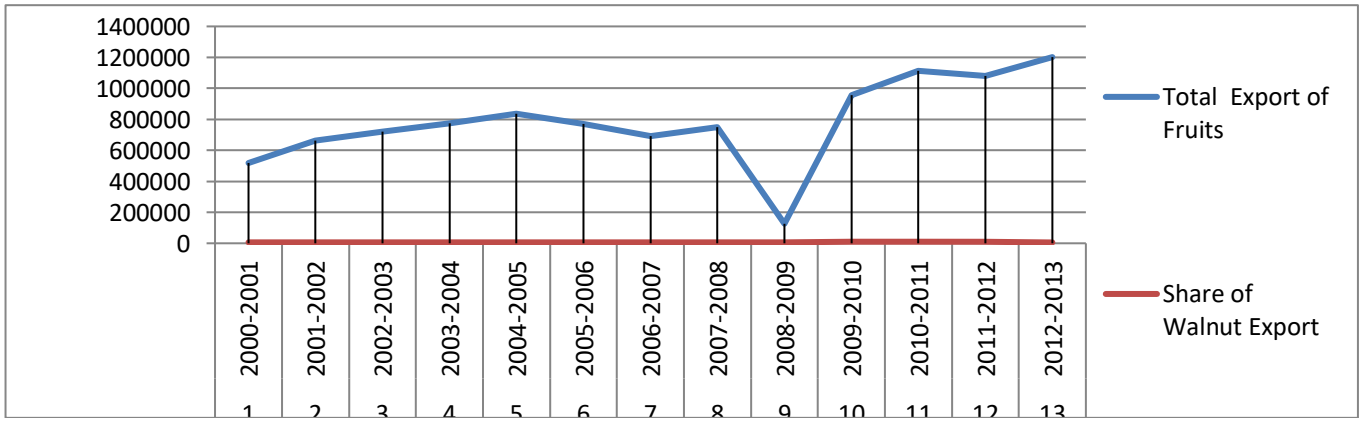
TABLE 2: EXPORT OF FRUITS AND SHARE OF WALNUT FROM JAMMU AND KASHMIR

S. No	Year	Total Export of Fruits	Share of Walnut Export
1	2000-2001	517000	7742
2	2001-2002	663000	7402
3	2002-2003	720000	7632
4	2003-2004	775293.59	6301
5	2004-2005	834389.27	5674
6	2005-2006	768878.48	5356
7	2006-2007	692895.08	5437
8	2007-2008	749788.13	6692
9	2008-2009	126404.88	5696.32
10	2009-2010	957000	9071.71
11	2010-2011	1112762.21	9524.55
12	2011-2012	1081701.31	9731.65
13	2012-2013	1201842.48	5295

Source: Directorate of Economics J & K (2010-11) Economic Survey (2013) Directorate of Horticulture, Govt. of Jammu & Kashmir, http://hortikashmir.gov.in (accessed on 15.09.2015

TREND LINE 2: EXPORT OF FRUITS AND SHARE OF WALNUT FROM JAMMU AND KASHMIR



Source: Directorate of Economics J & K (2010-11) Economic Survey (2013) Directorate of Horticulture, Govt. of Jammu & Kashmir, http://hortikashmir.gov.in (accessed on 15.09.2015

7. PROBLEBMS OF CLIMATE CHANGE

In India the whole Himalayan region has a unique and fragile ecology which is at present very much affected by climate changes, erratic rains, heavy snowfall, casing droughts, depleting glaciers, increased temperature, changing seasons etc. for last two decades in these high altitude states average mean temperature has risen from 1.450C to 2.320C effecting verdant of high chill

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needing fruits like walnut, apple ,apricot, almond, pear and cherries leading to leisurely increase in production and productivity particularly in rain-fed areas, where is obvious to decrease the growth of the high chill verities of walnut, apple, apricot etc. Due to the change of temperature conditions and decrease of the rain fall, diversify the fruits from lower altitudes to higher. The abnormal hailstorms and windstorms in different months are heavily damages to the various kinds of stone and pome fruits. There is a quite lot chance of snowfall. At the time of fruit flowering severe frost injury the fruits and during winter the higher average temperature damages the fruits in early of bloom and maturity. The warmer temperature in different crops and verities are found very beneficial. The carbon dioxide and increasing temperature are also effecting and creating the disease in the plants. Different diseases like mildow, Alternaria leaf spot and gummosis becomes severe threat to the pome and stone fruits such as walnut, apple, apricot etc. At the time of increasing temperature aphid diseases attack is happening about before two weeks. The white grub, red mite and scale insects have come out serious in nearly all fruits impacting quality of the production and productivity. There is require to develop heat and drought anti verities where yield architecture and physiology may be hereditarily changed to acclimatize to warmer ecological conditions further developing such technologies which alleviates and makes full utilize of the effects of changing climate.

8. SUGGESTIONS

1. Both Govt. and Ngos should organize programmes related to the impact of the climate changes in the fruit production. **2.** Walnut cultivators and horticulture experts should meet time to time to solve the climate problems in the production fields. **3.** To aware the people regarding importance of the walnut production and allocate the scarcity resources in proper manner.

9. SUMMARY AND CONCLUSION

In Jammu and Kashmir, several climate changes are effecting to the crop productions such as Walnut, Almond Apple, Saffron etc. at different times from flowering to harvesting the production from the trees. The high temperature in Kashmir and mid temperature in Jammu region decreases the quantity and quality of the walnut production. Furthermore climate problems such as unusual rains, hailstorms and drought are the main symptoms for the destruction of the fruit cultivation. The effective successful methods to control such problems are to take the agriculture conservation and adopt properly greenhouse technologies for the reduction of effect of climate changes. The states international share of the walnut production is 7 percent which is less than the states production capacity because continuous climatic changes, which creates different problems in cultivation period and harvesting times.

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