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An Analysis into Declining Production and Productivity of Saffron in Jammu and Kashmir

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Abstract

Jammu and Kashmir is only Indian state in which major proportion of quality saffron is produced but the area under the saffron cultivation is declining due to conversion of saffron land for commercial purposes causing a setback to this important activity. The area cultivated declined from 5707hac in1996-97 to 3785 hac in 2009-10 and production of saffron declined from15.95 (MT) in 1996-97 to 9.462 in 2009-10 and yield declined from 2.80(kg/ha)in 1996-97 to 2.50kg/ha)in 2009-10.Lack of proper irrigation facilities and adaptation of unscientific methods of cultivation has caused production and productivity to remain low. This paper highlights in detail the trends in production and productivity of saffron and factors responsible for causing decline in the production of saffron. Pressure due to increased urbanization on land on which saffron grows has been discussed and measures to be taken to increase production and acreage has also been discussed. Area under saffron production in different countries has also been analyzed and discussed in detail.

Key terms: Saffron, Corms, Productivity, Weed.

Introduction

Saffron (crocus sativus) Hindi name kesar, Kashmir and kishtwari name Kong is plant which belongs to Iridaceae family. The leading producers of saffron in the world are Iran, Spain, India and Greece. Saffron is sterile and does not set seeds. Therefore corm must be propagated by multiplication. Saffron flowers in autumn shortly after plantation. The remainder of its growing consists of initiation, filling up, and maturation of daughter corms at the beginning of each summer. In Greece saffron growing areas have more than 500 mm of annual rainfall while in Spain saffron grows in dry temperate condition with 400 mm of annual rainfall. Saffron is grown successfully non irrigated conditions of Jammu and Kashmir with (1000-1500) mm per annum.

Saffron is native to meditarrain environment characterized by cold to cold winters, with autumn winter rainfall and with very little rainfall. Flowers are usually picked early in the morning after due has evaporated but before flowers wither. The flower is cut at the base of the stem with a slight twisting movement and care is taken not to damage the leaves.

The quality of saffron is dependent on its coloring power (Crocin concentration) odour (safarnal) and taste. The best quality of saffron has safarnal content. Rain before 10-15 days of flowering results in excellent flowering Madhu Sahni (2002).

The limited production and wide variety of uses makes it a most expensive product both in national and international markets. Traditionally saffron is used in both Unani and ayurvedic system of medicines. It is used for kidney infections and for infections of gallbladder. It is used for eye infection after mixing it with rose. Mixed with it acts as memory enhancer and mixed with ghee and milk it is used for the treatment of migraine. It is used for inflammation in and for treatment of enlarged liver and for kidney problems. It is given to children to prevent them from cold in winters. It is used for the treatment of cancer in Indian system of medicines. Apart from medicinal properties it is used for coloring of butter, cheese, and confectionary. In certain cosmetics saffron pigment are used as natural colors. It is used for hair growth as it has synergizing effect.

Jammu and Kashmir is known for quality saffron and represents one of major saffron producing areas of world. The time at which saffron was introduced in Kashmir is not exactly known although evidence from (Rajtarangani) written by 12 century poet historian (kalhana) indicates its presence in Kashmir even before king Laltitaditya in 750AD whereas another historical account traced the origin of saffron to 3000 years back and its mentioned is found in historical documents found in meditarrain Asia and European countries. The Chinese historical documents of 3rd century AD reveals as being saffron from Kashmir to historical document saffron was brought to India by Persian rulers in 500 BC and they planted it on Kashmiri soil.

Review of literature

Objectives of study

1. ***To analyze area, production and productivity trend of saffron in Jammu and Kashmir and causes for declining production and area under cultivation.***
2. ***To find growth rate of saffron production in Jammu and Kashmir.***
3. ***To find out the share of various countries in area, production and productivity of saffron.***

Research methodology

This study is based on both primary and secondary data of production. Primary data has been collected from well designed questionnaire and personal interview. The secondary data has been collected from Directorate of agriculture Jammu and Kashmir and office of financial commissioner revenue. For the estimation of trend the equation: Y=a+bX has been used with method of least square.

Discussion

Saffron is being produced more or less intensively in Iran, India, Greece ,spain,Italy,turkey, France ,Switzerland,china,japan,UAE,Iraq. While the world's total annual saffron production is estimated at 2.05 t per year, Iran with more than 47000 ha, of land under saffron cultivation is said to produce 80% of this total i.e.; 160t khorasan province alone accounts for 46000 ha and 137 t of above mentioned total, respectively (perviz et al., 2004).second position in the production of saffron is held by Spain and India ranks third so for production of saffron is concerned. The Kashmir region in India produces between 5 to 6 ton mostly dedicate to India's self consumption .India production of saffron is restricted mainly to state of Jammu and Kashmir and himachal pardesh in India As per the official sources in past 10 years there has been a steady decline in saffron production due to shift of agricultural land to the commercial purpose; in 1998 the crop was grown over 4161 hectares which has come to 3715 hectares in 2009-10 which is the threat to saffron industry in Jammu and Kashmir ,undoubtedly we have achieved new heights in the field of agriculture and horticulture and also government has spent 100crore under saffron mission, there is still an urgent need for taking concentrate steps at the gross root level so that people may get more profits attached with profit of agriculture. The state cannot progress until economic condition and standard of living of farmers are improved as majority of people are still dependent on agriculture**.** The data on saffron shows that production of saffron has fallen over the years as there has been decline in both in productivity and area under cultivation of saffron as a result of which India has been net importer of saffron in the world. In 1996 the area under saffron cultivation in Jammu and Kashmir was 5707 hac which fell to just 3785inn 2009-10 hac showing a decline of more than 33% and production of saffron has declined from 15.95 (MT) in 1996-97 to 6.49

(MT in 2009-10. front the yield has declined from 2.80 in 1996 to 0.095 in 2001-02 and it remained 2.50 in 2009-**10**

Trends in production, productivity of saffron in Jammu andKashmir

Year	Area (ha)	Production (MT)	Yield (kg/ha)
1996-97	5707	15.95	2.80
1998-99	4116	12.88	3.13
1999-2000	3997	7.65	1.89
2000-01	2831	3.59	1.27
2001-02	2713	0.30	0.095
2002-03	2825	6.50	2.28
2003-04	2742	5.15	1.88
2004-05	3143	6.86	2.23
2006-07	3010	6.50	2.15
2007-08*	3280	8.20	2.50
2008-09	3280	7.70	2.34
2009-10	3785	9.46	2.50
2010-11	2479.196	9.50	2.55
2011-12	2469.023	10.00	2.64
2012-13			

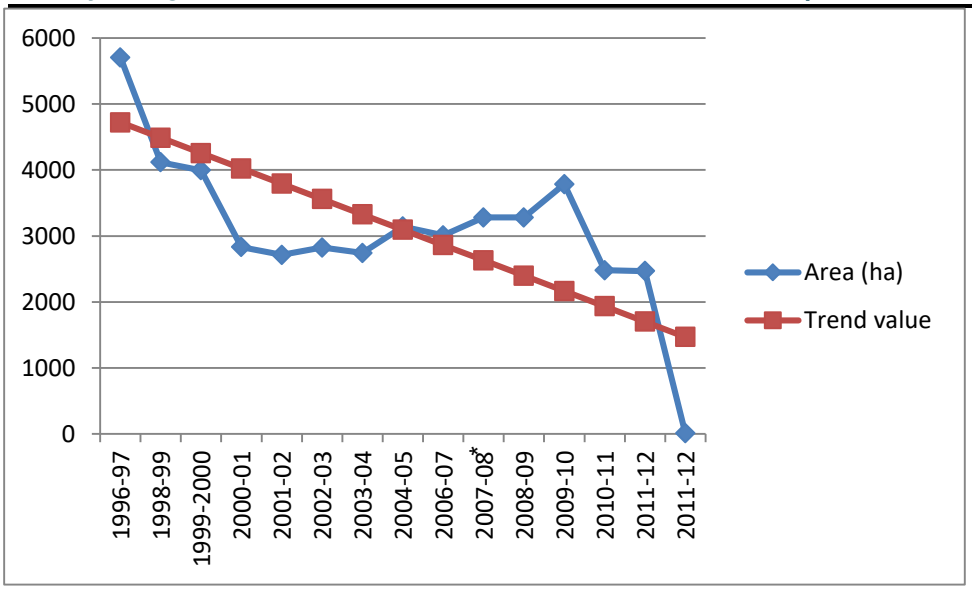
Source: Directorate of Agriculture Jammu Kashmir

Compound growth of production

The table above shows that there is compound annual growth of saffron production over the period of 14 years -3.06 % for the period of 1996-1997 reflecting falls in the growth of saffron production over the years. Dividing the whole 14 years period into 3 periods i.e; from 1996-1997 to 2002 and then from 2002 to 2007 and finally from 2007 to 2011-12 compound annual growth rate has been calculated. In the first period there is declining in the annual compound growth of horticulture production in Jammu and Kashmir by -16.43% and in the 2nd period the compound growth rate is 94.96% growth rate in the second period and finally in third period is 94.96. Thus the compound growth of horticultural production has fallen in the first period but it is increasing in the last period under the consideration.

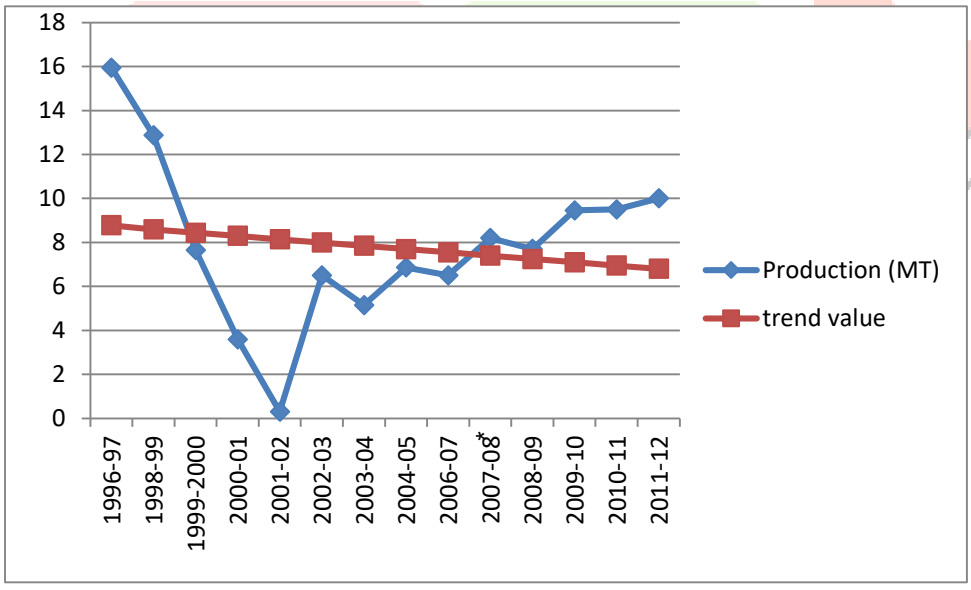
Trend line of area:

Area under saffron cultivation has been falling. The reasons for such decline are high cost ratio as labour is becoming costly. Further for the cultivation of saffron, trained labour that is aware of cultivation practices is required. The unfortunate trend of people leaving agricultural sector even if there is potential for good source of income in favour of service sector is also one of major reasons for such fall in the areas. The low prices afford to saffron cultivators by intermedreies have shifted their focus to the growth of other horticulture apple and walnuts which are increasingly becoming good source of income for the people.



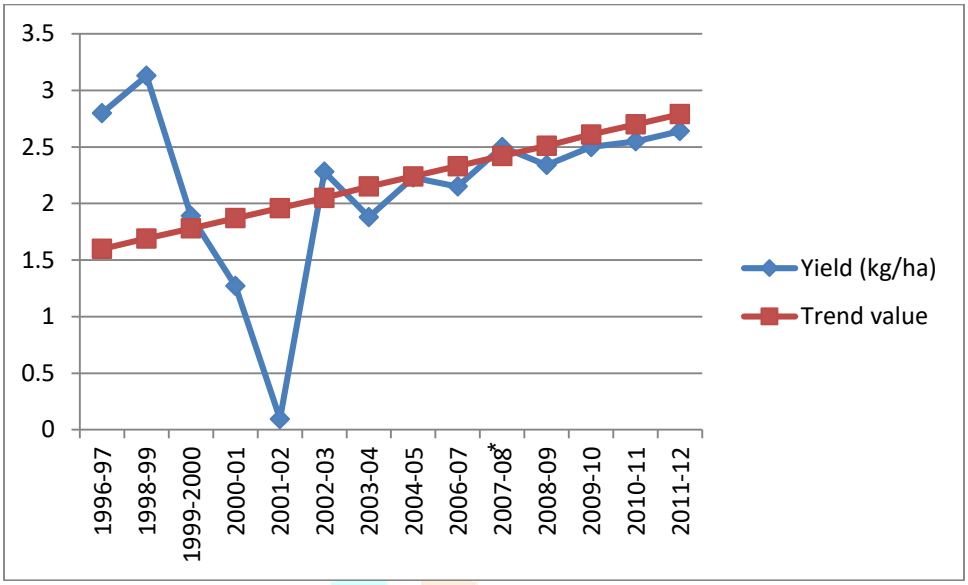
It is clear from the graph that there has been continuous fall in trend in areas under saffron production over the years which are worrisome and very unfortunate for Jammu And Kashmir State. The agriculture department should take serious note of this and encourage farmers to bring more areas under the saffron cultivation. Research on causes of decline in areas under saffron production should be enhanced and measures are a taken to prevent the commercialization of saffron land. There should strict prohibition of construction of houses on saffron lands.

Trend line of production.



The production of saffron in Jammu and Kashmir has shown wide fluctuation. With production being close to 16 MT in 1996 but fallen to the level of just 5 MT in 2005 but since 2005 production has been increasing but even 2012-13 , it is below the initial levels.

Productivity trend in saffron production.



Areas under saffron in different districts

S.no	District	Area
01	Pulwama	3200
02	Budgam	300
03	Srinagar	165
04	Kishtwar	120
Total		3785

Source: Directorate of Agriculture Jammu and Kashmir

District Pulwama is having major area under saffron cultivation followed by district Budgam. In district kishtwar only 120hac of area is brought under saffron cultivation.

Area, production and yield under saffron cultivation in producing countries

S.No	Country name	Area in hectares	Production (MT)	Yield (kg/ha)
01	**Iran**	43,408 (87.7)	174.00 (88.89)	4.00
02	**India**	4265(6.59)	7.50 (3.83)	2.29
03	**Greece**	1000 (2.02)	4.30 (2.19)	4.30
04	**Azerbaijan**	675 (1.36)	3.70 (1.88)	5.48
05	**Spain**	600 (1.21)	5.00 (2.54)	2.00
06	**Morocco**	**500 (1.01)**	1.00 (.50)	2.00
07	**Italy**	29.4 (.06)	0.24 (0.12)	8.16
Total		**49477.4**	**195.74**	**3.96**

(Source: annual report of directorate of Agricultural Jammu and Kashmir

The saffron is known for its aroma and color. It is perennial herb which belongs to the Iridaceae family and its monopolistic character in its production makes it most expensive species. The leading producer of saffron cultivation in the world are Iran, Spain and India with Iran contributing about 88% of world production and India at the same time produces 7% of world production with average productivity of 2.30 kg/per hectare. Saffron is mainly produced in state of Jammu and Kashmir and Himachal pardesh with area of around 5707 hac. Out of this area major portion of it 78.91 lies in Pulwama of Jammu and Kashmir followed by Budgam 12.27% followed by Srinagar 7.32% followed by Doda 1.5%.

*The production of saffron is highest in Iran with 43408 MT contributing about 87.7 % of world production. Thus Iran is major producer of saffron in the world followed by India with 4265 MT followed by Greece. India is at second place in the production of saffron but on productivity front it is at 5th place with*2.30kg/hectare. *The highest productivity is found in Italy with 8 kg/per hectare followed by Azerbaijan 5.48 kg/hectre followed by Greece 4.30 kg/hectare. Iran holds 4th position on productivity front. Thus it is clear that India's performance is poor on productivity front reflecting poor and traditional system of farming.*

Major causes of decline in production of saffron are:

(1)Quality Corms shortage: Production system followed in the production of saffron in J&k at present is responsible for low productivity of saffron. In Iran and Spain farmers use pluriannual system of cultivation under which saffron corms are left in soil for two consecutive years after which corms are removed from soil for fresh plantation. Graded corms weighting 8 and above are preferred for new plantation. Corms are irrigated during month of September and October using sprinkler technology which ensures timely corm sprouting and good flower yield, saffron is dried using electrical dryers/vacuum dryers which enhances quality of saffron. In Kashmir due repeated use of same substandard corm every, the productivity of saffron is grossly compromised. Even when seed corms become available when some farmers dig out their fields for planting new corms, the corms are sold at a high price which makes unaffordable for small and marginal farmers to buy. A large no of saffron fields have become senile on account of low plant population. Scientific studies have found that biotic stress on account of large plantation cycles have been found to be main cause of low productivity.

High dependency on rainfall: whereas more than 60 % of area under saffron cultivation is irrigated through proper means of irrigation, in Jammu and Kashmir major irrigation of saffron is entirely rainfed, if rain fails, production fails, .srivastava (1963) reported that areas receiving 100-150 cm of well distributed rainfall with snow in winters are essential for proper growth of saffron most quality corms. a rainfall of 100-150 is must in pre-flowering stage(kamili et el;2007).However climate change in Jammu and Kashmir has adversely affected saffron yield, there was drought from the period of 1993 to 2003 ,and during this productivity of saffron fell from 3.12 per hectares to 1.57.There was good rainfall during 2003-04 and productivity improved. According to nehvi(2004) and nehvi and makhadhoomi (2007) saffron requires 10 irrigation should be sprinkler irrigation at 70 m 3 ha 1 at an interval of 7 days at sprouting stage (25 august to 15 September) followed by 3 irrigations at post flowering stage (8^{th}

To 30 November) at weekly intervals .despite these recommendations not much has been done by government to incentivize farmers to irrigate saffron fields.

(2)Lack of assured irrigation: The expensive spice of saffron has **on** account of poor irrigation facilities. Major area under saffron cultivation is rainfed and quality and quantity is adversely affected whenever draught condition exists. In Kishtwar district much more area can be brought under saffron cultivation but due to scarcity of water resources, people leave the land either fallow or cultivate crops which are draught tolerant, similarly in other districts also area under saffron cultivation has declined and one of the reason being lack of irrigation. According to project on saffron development there is need to establish 128 tube wells with 100% assistance in project to targeted areas .

(3)Marketing of saffron: marketing of saffron is unorganized. It is largely in the hands of brokers, with a long chain of intermediaries linking the grower to the consumer. Farmers are ignorant of prices prevailing in the market which causes exploitation of growers.

(4)Production practices: the production system currently followed in Kashmir is responsible for the lower productivity of saffron. In Iran and Spain farmers use pluriannual method of

cultivation under which saffron corms are left in the soil for 2 years after which they are removed and new corms are planted. Corms are irrigated during the month of September and October.

(5)Lack of testing and grading centers: in Jammu and Kashmir with excepting of SKAUST there is no grading and testing center at district level which prevents us to develop brand Kashmir as a result there is no proper packing and certification at the district level.

(6)Weather stations: we lack weather stations at district level to disseminate up to date information in those districts to cultivators who cultivate saffron.

(7)Poor soil fertility: soils in Jammu and Kashmir have become deficient in micro nutrient contents as saffron is grown year after year without organic moisture or chemical fertilizers. No systematic control measures are presently being adopted by farmers (Ghani-2002). The application of chemical fertilizers also results into an increase in the saffron yield.

(8) ***Poor weed management: the*** recommended moisture of saffron is 8% but in Kashmir traditional dying system of saffron raking about 27-53 hours in shade leaving moisture content of more than 10%. Thus more than recommended moisture content reduces the quality of product.

Containmination: the Containmination of spices may occur at the stage of harvesting, handling, transportation and storage of spices (Sjoberg et.al 1991). It is containminated with yeast, and bacteria.

Packing: saffron growers of Kashmir store saffron in earthen pots or polythene bags without taking care of moisture (Mir et.el 2008) thus reduce the quality of corms.

(9)Commercialization: the increasing commercialization of land has caused the reduction in the area under saffron cultivation. The increasing land prices has pushed many people into this business raising serious concerns. The pressure of urbanization has resulted into conversion of saffron land into commercial purposes.

Conclusion: Production of saffron is decreasing in saffron hub of India (Jammu and Kashmir). Adoption of traditional practices has resulted into low productivity. On productivity front India ranks 5th out of 7 countries. Government has not done enough to convert saffron cultivation from rainfed cultivation into irrigated cultivation. Domestic demand for saffron is very strong and domestic production is not sufficient to meet even home demand. An effort needs to be made to bring additional area under cultivation besides making improvement in productivity.

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