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Qualitative Analysis of Factors Influencing the Decline of Saffron (*Crocus sativus*) Cultivation in the Valley of Kashmir, India: Need of Regaining its Legacy

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Abstract

Kashmir is world famous for the cultivation of rich and quality saffron (*Crocus sativus*) and is one of the major saffron producing areas of the world. However, there has been decline in the production of saffron over the years and the current study is aimed at studying factors which has negative impact on the production and cultivation of saffron (*Crocus sativus*) in Kashmir. To examine the factors which has negative influence on the declining of saffron industry in Kashmir, the current study used descriptive qualitative research design to answer this research question. The researchers identified the three major saffron producing villages (Dusso, Chandhara and Lethpora) wherein major and experienced 36 saffron growers were selected using purposive sampling technique the data of the growers was retrieved from the records of Revenue and Agriculture Departments. Key-Informant interview schedule was used during the interviews which was developed and validated by two independent experts working in agriculture field. Thematic analysis was carried and colour coding of the statements were done for the themes by the researchers which were reviewed by two supervisors. The findings of the study indicate that there are various factors which are responsible for the declining of the saffron industry in Kashmir. The findings suggest that climate changes, irrigation facilities, marketing, awareness and training about cultivation, availability of unexperienced labour force, illegal construction on saffron land, clandestine of cheap saffron, adulteration, and non-availability of good quality saffron corms were the major factors found in the study responsible for declining of saffron cultivation in Kashmir and the conversion of saffron land into commercial purposes. The study has implication for the future research focusing on the factors and coming up with grower friendly interventions to protect this cash crop from declining.

Keywords: Saffron, Kashmir, Marketing, Adulteration, Shifting, Urbanization, Land Conversion

1. Introduction

Saffron (*Crocus sativus*) is a spice derived from the flower of *crocus sativus*, commonly known as the “saffron crocus”. One of the legacies of saffron farming practice for centuries in and around the Pampore Karewas of Kashmir in India is that this ancient farming system continues to inspire family farmers and local communities through their livelihood security that it provides for more than 17,000 farm families. Saffron a perpetual herb, famous for its fragrance and used for condiment, is a culinary delight. The most important part of the saffron is stigma which is used for commercial purposes. Apart from its use in cooking and preparing dishes and sweets, it also has medicinal benefits as its powdered form is used in treating various illnesses like bronchitis and cough where it is used as an oral sterilizer and as a sexual intoxicant to treat cases of frigidity. It is also praised because of its vitamin content (B1 and B2) as well as its high levels of beta carotenes. It is believed that origin of saffron is located on a vast area of earth like, Greece, Turkey, Iran and central Asia. Saffron is currently being cultivated more or less intensely in Iran, India, Greece and some other countries. According to other historical evidences saffron was brought to India by the Persian rulers around 500 B.C. In India it is cultivated in the State of Jammu & Kashmir from September to November and produces 8 to 10 tons of Saffron (Ahmad Tantry, Bashir Ahmad Dar, & Singh, 2017). In Kashmir it is mostly cultivated in Pampore town constituting 76.64% of total produce of saffron of the state. Besides Pampore it is cultivated in Srinagar (6.68%), Budgam (16.13%), Doda (2.50%) and Anantnag districts of Jammu and Kashmir (Husaini, Kamili, Wani, Teixeira da Silva & Bhat, 2010) [Figure, 1]. Saffron (*Crocus sativus*) covers about 4% of the total cultivated area of the Kashmir valley and provides about 16% of total agricultural income (Anonymous, 2008). The saffron cultivation is the second largest activity after the production of fruits in state. So, it is important to introduce the new techniques to promote the saffron cultivation modern scientific techniques must be included. Saffron is one of the most important export products and plays a significant role in the economic development of the state as it provides employment to about 5% of workforce in the Kashmir valley (Taufique, Khursheed & Ahmad, 2017). As per the government the state has an average production of 91.25 quintals of saffron in the year 2007-2008 (Directorate of Economics and Statistics, 2008) however, there has been a reduction in the productivity, production and marketing of Saffron during the last 10 years [Table 1] due to various factors i.e. uncertain climatic conditions, inadequate irrigational facilities, lack of availability of good- quality corms and seed material, poor soil fertility, infestation by rodents and diseases, poor post-harvest management, improper marketing facilities and increased urbanization on saffron lands. Besides that, due to its high value makes saffron the object of numerous adulteration and fraud (Ahmad Tantry et al., 2017).

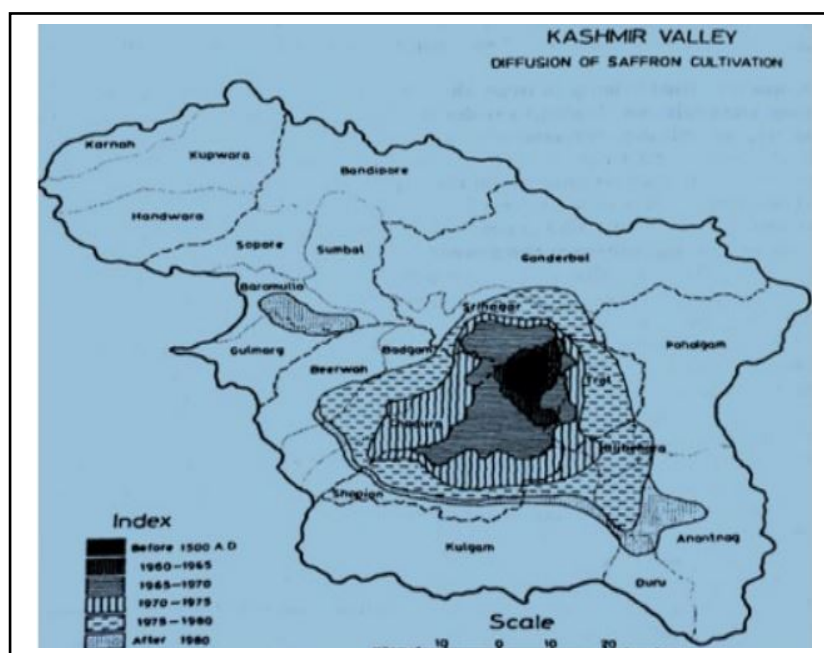


Figure 1: Distribution of Saffron production areas in Kashmir (Source, mapsofindia.com)

The saffron industry in Kashmir is also contributing to employment generation to Kashmiri village women who contribute to this agriculture heritage through traditional tilling to flower picking over 3,200 hectares dedicated to the legendary saffron crop cultivation at Pampore. However, it has been facing grave challenges in production, sustainability and livelihood security with urgent need to adopt appropriate technologies. Kashmir has the huge potential of emerging as the global leader in the production of quality saffron if provided the adequate infrastructure, irrigation facilities, focus on marketing and providing the scientific aptitude among the saffron growers by adopting modern agro-technology, better pre-and post-harvesting management strategies. However, these techniques and services have not been given much attention which has led to the declining of the saffron production in Kashmir and farmers became ready to turn their land to build houses, residential complexes, and apple orchards. Due to rapid constructions the saffron land has been shrinking drastically from last few years [Figure 2 & 3]. In the present study we highlight the factors which are influencing the decline of saffron production in the Kashmir by adopting qualitative analysis of interviews conducted with saffron growers.

Table 1: Present trends in saffron production

| Year | Rejuvenated under NSM | Cumulative Total | Average yield/ha | Normal | Average yield/ha |
|---------|-----------------------|------------------|------------------|---------|------------------|
| 2010-11 | - | - | - | 3715 | 2.7 |
| 2011-12 | 331 | 331 | 4.5 | 3384 | 2.75 |
| 2012-13 | 943 | 1274 | 4.5 | 2441 | 2.75 |
| 2013-14 | 528 | 1802 | 4.5 | 1913 | 2.8 |
| 2014-15 | 157 | 1959 | 1.5 | 1756 | 1.5 |
| 2015-16 | 176 | 2135 | 5.5 | 1580 | 2.8 |
| 2016-17 | 79.81 | 2214.81 | 5.4 | 1497 | 2.85 |
| 2017-18 | 172.9 | 2387.71 | 1.64 | 1323.75 | 0.973 |
| 2018-19 | 74.29 | 2462 | | | |

Source: Directorate of Agriculture, Kashmir



Figure 2: Shrinking Saffron Fields at Lethpora

(Source: Google Earth) 3599m 33°58'19"N 74°54'52"E 1589 m]



Figure 3: Shrinking fields at Dusso Pampore

(Source: Google Earth) 3917 m 33°58'42"N 74°58'27"E 1634m]

1.1 Government initiatives for saffron production.

Over the few years the saffron production has witnessed a drastic reduction and which has affected the growers economically leading to conversion of the land into commercial complexes, residential dwellings and other purposes. In order to sustain the saffron production in Kashmir which is considered finest of all saffron around the world. The local has responded with The National Saffron Mission (NSM) which was announced by then the Prime Minister of India Dr. Manmohan Singh. It was introduced in year 2010-11 by Union Agriculture Ministry and under this mission the saffron cultivating farmers are given a subsidy of (Rs.2,64,000 per acre) to meet the technical and material ends to boost the crop production. This mission covers almost all technical aspects of cultivation like (drip irrigation), (mechanization), (research), and (marketing support) to come out from the crises. Under this mission Govt. put forth many steps to enhance the market availability of the locally produced saffron. The government limited the imported saffron especially from Iran as it flooded the market here because of low cost which directly impacted the state economy (Rashtriya Krishi Vikas Yojana,2010).

To further boost the cultivation insurance scheme was launched to provide the security to the growers and cultivators. This scheme covers crops for dry spells and heavy rainfall or insufficient produce. Under this scheme the department would share 50% of its premium and the farmers have to pay other 50% to insurance companies. According to this scheme the one hectare of saffron cultivated land would be insured against (Rs 200,000) and the 12% of the insured sum would be paid for the premium (Dar & Sharma, 2016)

Another step to boost the production of saffron in Kashmir, Good Practices for Saffron Guidelines were developed by Sher-i-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST,n.d) with the aim that following good practices will reflect good production in Saffron in Kashmir which will ensure an average productivity of 5kg over a period of 4-5 years and will enhance economic benefits to saffron growers and ensure their livelihood security on long term basis. More importantly recently the Central Government has given GI (Geographical Indication) Tag to Kashmir with the view that it is very precious and costly product and would gain more prominence in the export market (The Hindu,2020). All these steps have been taking to maintain the heritage product of Kashmiri saffron. Apart from these growers are regularly given trainings, awareness programmes are being conducted, micro-credit financial help is provided to the to build their skills and help them to increase their production and cultivation.

Despite the proactive steps and services provided to growers, there has been drastic reduction in the saffron production over the last years which is affecting the cultivation as well as market outreach of this product. From the last couple of decades, growers have witnessed a declining trend of Saffron production in the valley of Jammu and Kashmir as the data also reveals. The land used for this famous cash crop commonly known as Golden Spice has shown waning trend from last one decade and growers have started moving out of this cultivation due to number of reasons which need to be explored [Figure 4 & 5]. Keeping in mind these changes the researchers have designed a study to understand the causes and factors leading to the commercialization of saffron land in Kashmir.

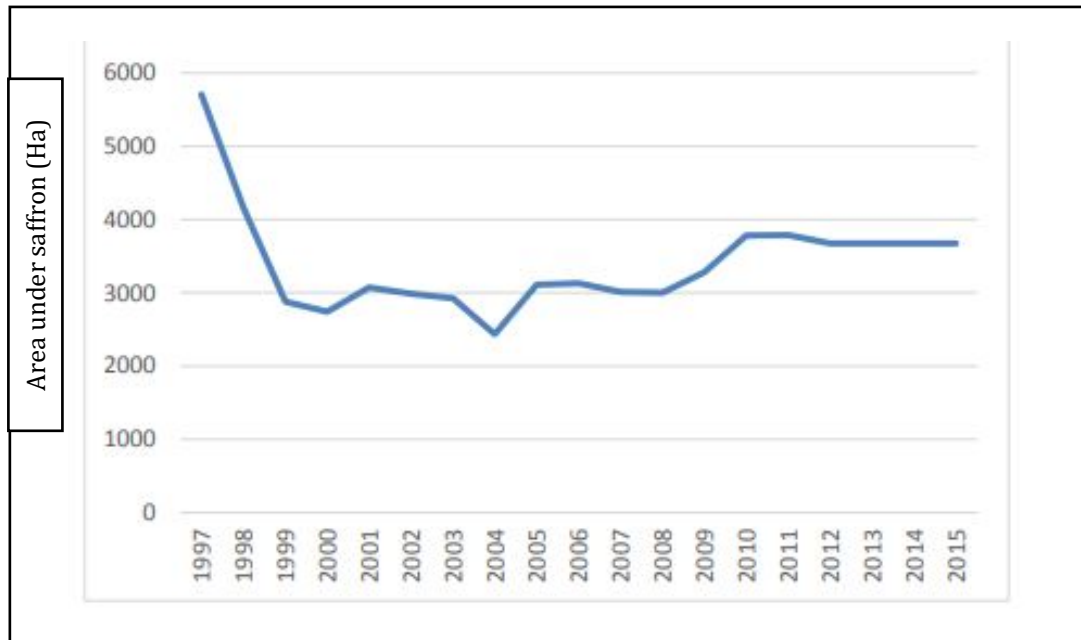


Figure 4: Area under Saffron (Ha.)
(Source: Department of agriculture, Kashmir)

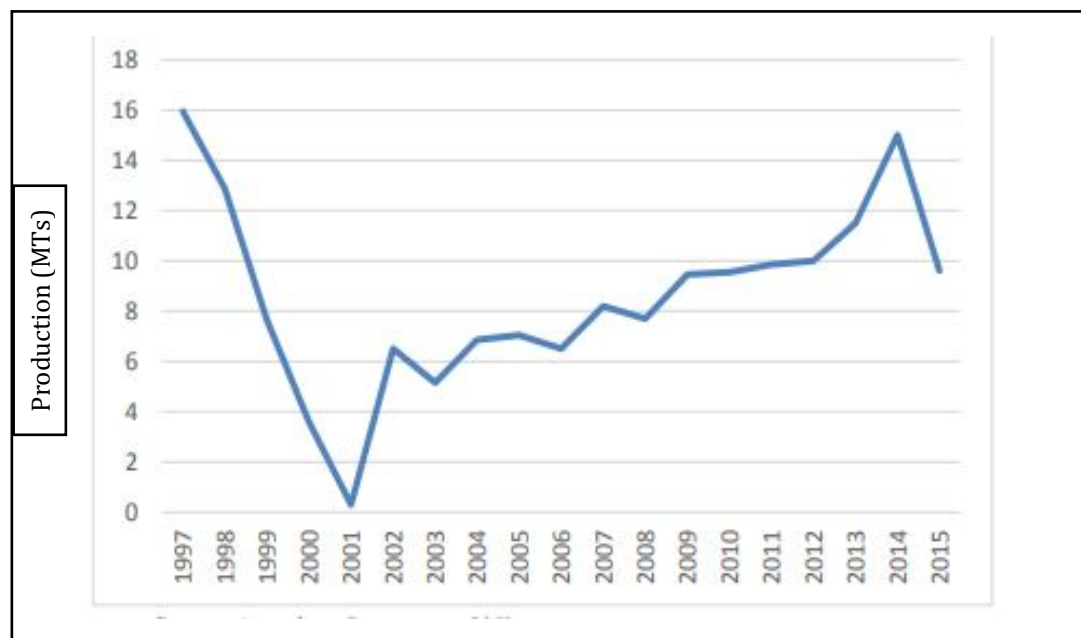


Figure 5: Production of saffron
Source: Department of agriculture, Kashmir

2. Method

2.1 Research questions

The main research question of the study is to examine the factors that lead to the conversion of saffron cultivation land to commercial or residential purposes and also to examine other logistical factors which are contributing to its conversion.

2.2 Methods and Materials

The study used descriptive qualitative research design. Where in 36 saffron growers of three villages (Dusso, Chandhara, and Lethpora) from Pampore were taken into the study. The study was conducted in these three villages because they contribute highest in terms of saffron production and have witnessed higher rates of land conversions as well. The study used key informant interview schedule and the data was collected from the growers after taking written informed consent. This study recruited purposively only those persons who have been associated with saffron cultivation for at-least 20 years and possess some basic experience about the cultivation, cropping patterns, awareness and marketing. The data maintained by government revenue department were also used to prepare the list of growers who meet the criteria as mentioned earlier to avoid bias.

The major questions asked during the in-depth interviews were related to basic socio-demographic factors household composition, educational profile, land ownership, economic status, land possession of saffron cultivation and agriculture land, skill practices, trainings and awareness, cropping pattern, returns and the problems involved in cultivation of saffron, factors affecting its productivity and the constraints in the production was collected from selected saffron growers.

2.3 Data collection and Analysis

Written informed consent was taken from the participants who were selected for the study. The forms were given to them one day prior to the in-depth interview. Participants were made understand about the purpose of the study and it was made sure that they understand the details of the data collection. Participants were asked open ended questions and were told to answer the question based on their experiences and practices. In order to make the participants comfortable the interviews were taken in their respective houses and taking the due permission.

2.4 Procedure

The interviews were taken by the three researches by dividing the number of participants equally and each interview was taken for about 90 minutes. The interview schedules filled by researchers were in the sealed envelopes. All the schedules were destroyed after the analysis and generation of the themes by the researchers which were validated by two independent examiners having eight years of experience in rural development and agricultural sciences. The interviews were conducted in Urdu and Kashmiri languages using audio recorder. The interviews were transcribed and coded by the researchers using different colors to represent different factors. The statements and colour codes were reviewed by two independent supervisors in order to ensure that individual biases and assumptions did not influence the analytical process.

3. Results

3.1 Personal and Farming characteristics

The [Table 2] presents sociodemographic details of the respondents, a total of 36 participants participated in the study were in the age group of 36-75 years (mean age of 56.9 years [Table 2]). Nearly (22%) of the respondents have not been to the formal education, and (78%) had gone through formal education. More than (50%) of the respondents have reported to have chosen non-agricultural jobs over a period of time as they witnessed a downfall in the saffron production affecting their earnings. From the personal details and experiences of saffron cultivation as mentioned in [Table 2 & 3] it can be concluded that even though the growers are cultivating the saffron from years but there is lack of knowledge and awareness among the which can also be one of the factors negatively affecting the production. The results also present that although 81% of the respondents [Table 2] have gone through secondary and college education but a grower always need skill-based knowledge, awareness and right methods available to put in practice. More than half of the respondents (61.1%) have the land possession of below 3 hectares earning very minimal from the cultivation during the recent declining trends which often make them to think of switching the land to other purposes to earn good for themselves [Table 3]. Among the respondent's half

are able to adopt the skill practices while cultivating the saffron crop. In similar manner the respondents affirmed that they have not received any sort of training from the concerned agencies which sometimes put them in dilemma about the practices related to the cultivation of the saffron. Most of the growers often use traditional practices and methods while cultivating the saffron and they lack knowledge about the right ways of ploughing the land, use of unexperienced labour who often damage the corms , seasonal challenges and more importantly they have shifted to other jobs having inadequate time to put in the fields [Table 2&3].

Table 2 Socio-demographic Details

| Variables | Sub-Variable | Frequency(N=36) | Percentages (Mean) |
|-----------------------|---------------------|-----------------|--------------------|
| Age | Age | 36 | 56.9 years(mean) |
| Gender | Males | 29 | 80.5% |
| | Females | 07 | 19.4% |
| Education | Illiterate | 8 | 22.2% |
| | Secondary | 22 | 61.1% |
| | Graduation | 6 | 16.6% |
| Socio-Economic Status | Above poverty level | 26 | 72.2% |
| | Below poverty level | 10 | 27.7% |
| Main Occupation | Agriculture | 17 | 47.2% |
| | Non-agriculture | 19 | 52.7% |

Table 3: Saffron cultivation Experiences

| Variables | Sub-Variable | Frequency(N=36) | Percentages (Mean) |
|----------------------------------|------------------|-----------------|--------------------|
| Land Possession | Above 3 hectares | 14 | 38.8% |
| | Below 3 hectares | 22 | 61.1% |
| Skill Practices | Yes | 18 | 50% |
| | No | 18 | 50% |
| Cultivation training | Yes | 03 | 08.3% |
| | No | 33 | 91.1% |
| Awareness about right ploughing | Yes | 22 | 61.1% |
| | No | 14 | 38.8% |
| Awareness about Season Ploughing | Yes | 33 | 91.1% |
| | No | 03 | 08.3% |
| Awareness about sowing of Corms | Yes | 28 | 77.7% |
| | No | 8 | 22.2% |

3.2 Qualitative Narrations

The decline in the productivity of the saffron has caused distress among the farmers and changes in the climate and inadequate trainings have added to their distress. The saffron cultivation has lost a bit in market shares and

it has increased the share of unemployment in the region. the cultivable land has lost its fertility due to excess use of fertilizers and less availability of water in the region in order to alleviate these issues the government has proposed many schemes to enhance and faster the production of saffron in the region but the situation has not improved at the ground level as farmers are constantly witnessing decline in the growth. In most developing countries, the drawback in the operation of the dual sector approach is reflected in the adverse terms of trade, and realizing the problem of unemployment and livelihood in rural areas (Tripathy, 2009). The following are the themes generated after the analysis of the interviews with the respondent. Their own experiences help them to understand the issues causing decline in a more detailed form and understand their context of how to improve the productivity. The following section presents the experiences of the saffron cultivators under different themes.

Table 4: Themes reported by Saffron growers

| Themes | Frequency | Percentages |
|----------------------------------|-----------|-------------|
| Irrigation | 33 | 91.6% |
| Marketing | 30 | 83.3% |
| Adulteration | 21 | 58.3% |
| Climate Changes | 17 | 47.2% |
| Illegal Construction | 20 | 55.5% |
| Expensive Labour | 12 | 33.3% |
| Inadequate technology & Training | 22 | 61.1% |

3.2.1 Irrigation Facilities

The saffron cultivation requires timely at proper irrigation for the nourishment and growth seed corms for better output, but due to climatic change, irregular rainfall farmers face irrigation which requires government intervention for irrigation facility but it fails (Dass & Deshpande, 2017) . The State of Jammu and Kashmir faced an acute drought in 1999-2003 (Alam, 2007) and during this period productivity was reduced from 3.12kg/ha to 1.57kg/ ha. However, in 2004-05, favorable rainfall improved the productivity also to 2.96 kg/hectare. The government agencies under the National Saffron Mission, set up in 2010, to rejuvenate Saffron cultivation in Jammu and Kashmir, drafted measures to provide better and regular irrigation facilities to the farmers but the irrigation has not reached to the growers. Therefore, cultivators were left with no choice to switch to high-density crops such as apple, walnut and garlic, etc. The response from the agencies has not been adequate to enhance the proper irrigational facilities which could have become game changer to increase production as well as productivity of saffron industry in Kashmir (Haq and Shafi,2014)

“The scheme proposed that the bore wells would be connected with an equal number of sprinklers. However only 8-10 sprinklers were found functional on the ground. There is no proper drainage system. Water pipes are not properly channelized in the saffron fields which added to the farmers woes”, [C1, C5, C11, C12] explained.

3.2.2 Marketing related issues

Saffron has an unorganized market, as the grower has no direct contact with the customer. There is a long chain of intermediaries. The majority of the saffron is sold to brokers (Dalals) accounting 70.86 percent while 16 ppercentis sold through sub-firms and only 13% is sold through other agencies (Aga, Wani G, Khanday, & Wani S, 2008). Farmers are exploited due to ignorance regarding the prices as intervention of the government in marketing is not available to get fair remuneration to the cultivation (Dass & Deshpande, 2017; Taufique, Khursheed, & Suhail Ahmad, 2017). Government agencies play very little role in marketing of saffron and hence its distribution remains in the hands of intermediaries especially Dalals (brokers) and local traders, retailers,

wholesalers and firms who make huge profits leaving no scope for the farmers to progress (Qardri,2018) which has made the farmers to sell their to local produce who take huge margins out of the profit and affecting the growers economically.

“ There is no fixed and reasonable price for the saffron crop .we do not get fair and full return in terms of profit from the crop also we are not aware about the market price of our crop so we sell the crop on meagre amount to the brokers as we cannot kept them long time without proper preservation. As long preservation took more cost which we cannot effort. The cultivators demand for the direct contact with the consumers. The government should intervene actively in marketing by providing direct market at national and international level to the growers so that they can sell their products themselves without any broker or intermediaries” [C2, C15, C30] explained.

3.2.3 Adulteration of Saffron

Adulteration is done by mixing Iranian saffron or other low quality saffron or other ingredients like maize, plastic or wax with the original one i.e. Kashmiri saffron. Paper cuttings coated with sugar, meshed and dried flesh fibers dyed stigma of maize or corn slick fats oils and glycerin are used to increase the weight of saffron by traders later the same quality of saffron is sold to the tourists who come to visit in large numbers (Husaini, Kamili, Wani, Teixeira da Silva & Bhat, 2010). Adulteration of the saffron is also causing a threat to the declining of Kashmiri saffron at the international market. It is an emerging threat to the industry as large market share of saffron is being exported through sale of spurious saffron and thus warrants detection of adulterants and there is thus need for devising mechanism for spot detection of adulterants.

“Most probably Iranian saffron is mixed with the Kashmir saffron due to the many reasons as Iranian saffron is produced constantly in bulk; it is also being available at cheaper price. Ironically there is no official agency to check the menace. Even government is also involved in the supply of Iranian saffron as the Kashmiri saffron is costly and is not available in abundant and is declining due to one or the other reasons” [C3] narrated.

3.2.4 Illegal Construction in Saffron Fields

Unfortunately, saffron fields are slowly converted for construction purposes because of economic prosperity of the area which is located only 12 kilometers from the capital Srinagar. Despite the implementation of the saffron Act in 2007, the acquisition of land for residential purpose has gone unchecked. Even people are thinking of changing their saffron land into apple orchards or other fruit orchards which will lead to maximum profit with minimum cost or input. Land brokers of the area try to the construct the business firms in the saffron fields and with this construction of the various business plants air pollution caused by heavy traffic in the saffron belt Pampore and recently the mercury accumulation in the in the field of saffron which is closely to cement factories This will have negative impact on the saffron cultivation in nearer future as the Kashmir is known for this heritage crop. The fields also with the high rate of fossil fuels and highly increased mining which is burning by these cement factories have been pointed as the main sources of pollution. There has been very low response from government agencies to prevent the saffron fields for turning into residential colonies.

“While having interview session with the farmers, one amongst them said that he is going to construct house over the saffron land as he is not getting the good return from the saffron production. The major reason for saffron decline is the unchecked and unabated construction activity in the areas which are meant for saffron cultivation he further blamed that government for turning the saffron fields into residential colonies as they are themselves constructing buildings on the saffron land i.e. the newly allotted degree college, Spice Park and some other government buildings around the saffron fields which in turn is reinforcing people to practice the same” [C4, C22] explained

3.2.5 Climate changes

Corn sprouting flower initiation and time of flowering are the critical stages that are influenced by environmental fluctuation in terms of temperate and availability of water. Day temperature of 230 c -250c in the month of September is critical for corn sprouting and flowering starts when the day temperature reaches to 170c with a night temperature around 100c. Besides temperature, water is the critical factor for these changes during September. Any change in the critical limit of among these factors, influences the growth of the saffron plant. Especially dry summers, monsoon seasons and floods have played a key role in the decline of production of saffron industry. Due to climate change in the last some years the weather has become quite erratic and rains are either scanty or distribution is irregular, thus adversely affecting the critical stage of flowering in saffron. Kashmir faced an acute drought in 1999–2003 (Alam, 2007) and during this period productivity reduced from 3.12 kg ha⁻¹ to 1.57 kg ha⁻¹. During 2005, favorable rainfall improved saffron productivity to 2.96 kg ha⁻¹.

“In recent years we are facing various climatic changes in our atmosphere i.e. global warming, dust, pollution, etc. which has badly hit the saffron industry” [C5, C28] narrated.

“unexpected and sudden heavy rains over a short period on poorly drained saffron soils are causing great woes as it will turn the saffron corms to rotting fungi” [C8, C33] narrated.

3.2.6 Expensive and unexperienced labour

Saffron cultivation is labour intensive which requires lot of personnel from tilling to post harvesting process. A study on economics of saffron cultivation in Jammu and Kashmir reveals that human labour is the main item which cost 40.09% per hectare i.e. family labour and hired labour costs 2026.64 and 7333.34 respectively (Ganaie, Dwivedi, & Bhat, 2017). The growers have largely remained dependent on non-local labourers and saffron growers to plough or remove weeds in the fields. The labourers are not aware of the growth and sensitive nature of saffron. Often while working, they cause injuries to corms, resulting in damage to seeds, and thus the produce.

“During early times we used to do all process regarding cultivation of saffron ourselves i.e. all members of the family used to work in the saffron field with traditional methods/ practices with zeal and enthusiasm, thus the production was more and of good quality. But our new generation shows no interest in cultivation due to their own busy schedules either in studies or in employment. For this reason, we have to hire laborers who are outsiders and have no knowledge about the saffron cultivation which could be possibly one of the reasons for decline in the productivity of the crop. It also costs high to pay for their labour” [C6, C7,C11] explained.

3.2.7 Inadequate technology & Training

The world is rapidly going industrialized and use of technology is considered as backbone of every sector. The growers in Kashmir are using indigenous and traditional techniques to cultivate saffron which often produce declining results. To improve the yield and productivity this sector also needs the latest technology for improvement and development. Other countries have excelled very well in cultivation of saffron where use of technologies and trainings are put in practice at every stage in sowing, harvesting and in post harvesting process. The farmers are lacking in training and making use of the new technologies and machinery to get benefitted from them. The outdated technology is also considered as the cause of fertility loss of soil and in decrease in production.

“So, it is true that farmers receive no trainings from the agencies and lack the knowledge about how to make use of modern technological tools machineries. If growers are provided adequate training and information the production can be increased and the grower will get benefit out of it and will make cultivation economically viable and ecologically sustainable” [C10, C19] reported.

4. Discussion

The valley of Kashmir is a major saffron (*Crocus sativus* Kashmirianus) growing area of the world, second only to Iran in terms of production. Saffron is the highest priced agricultural product due to its medicinal and other benefits. The available data shows that more than 95,000 farm families are associated with this cash crop directly or indirectly in Iran & India with 13000 families in Kashmir, therefore, there is an urgent need of creating efforts to protect this Golden Spice from declining and also to protect the economic interest of the families associated with this cultivation (Nehvi, 2010). Saffron being low nutrient plant requires a modest amount of nutrients. Kashmir, despite being one of the oldest historical saffron-producing areas, is now facing a rapid decline of saffron industry (Husaini, Ashraf Bhat, Kamili, & Mir, 2013). The total area under this crop in the State in 2012 is 3785 ha with an annual production of 11 t while almost one and half decade back in 1997 the area recorded was 5707 ha with an annual production of 15.95 t [Figure 4 & 5]. The lowest productivity of 1.57 kg ha⁻¹ was recorded in 2003–04 due to an acute drought from 1999–2003. The data clearly shows that there is need of response from the agencies in protecting the heritage crop and livelihood of the people. The fertility of the soil is reduced if saffron is grown year after year without the supply of nutrients through organic manures and / or chemical fertilizers. The soil becomes deficient to support the growth of corms and the productivity reduces very drastically. The findings of and narration of the respondents clearly presents that the use of modern technologies including biotechnology, creating awareness, trainings of cultivation, having a sound and structured market options can play a good role in preventing its decline (Mousavi & Bathaie, 2011). Over the past years the irregular rainfall, inadequate drainage systems, failed irrigation has resulted in poor fertility and affected the production levels of this crop. Lack of timely trainings and awareness programmes (at pre-and -harvesting period) to the farmers also resulted in its decline. The decline over a period of time has caused distress and worry among cultivators which resulted in huge illegal constructions, land conversion, shifting agricultural practices and illegal colonies.

Other concerns witnessed are improper marketing options which has created a way for brokers who take away huge margins out of the profit leaving the grower with minimal income. The influence of the brokers and inadequate marketing and grading options have resulted in adulteration of the crop and stretches the gap between the farmer and consumer. Adulteration and marketing of the saffron products which are both exploiting and depleting the name and fame of Kashmiri saffron as well as discouraging the saffron growers. Thus, there should be direct contact between saffron growers and consumers so that adulteration could be avoided with structured marketing channels. Once marketing is regularized the demand would increase and the farmers will get better incentives and subsequently divert more land for the cultivation of this crop. One of the positive change growers have witnessed last year 2019 was local labourers were used in cultivation which proved fruitful as non-local labours lack the skills and cause damage to the production. The latest and formidable challenge is the adverse effect of climate change as global warming has badly hit the saffron industry (Husaini, 2014). People are becoming more urban centered due to which they are converting their agricultural land into construction of buildings and complex which is more ironic. Due to less saffron production people are switching towards apple orchards fields and construction as climate no more favoring saffron. These factors have highly affected the production of saffron which subsequently resulted in the decline of income of growers cultivating saffron. Subsequently, this decline in production has led to rapid construction of buildings, land conversion into other agricultural cultivation purposes and increased the distress among the growers facing various challenges related to saffron cultivation.

The present study therefore, need to be extended in the multiple areas such as marketing, trainings and skill building programmes, irrigation facilities, prevention of illegal constructions, good cultivation practices and prevention of rapid urbanization. Prevention of mal-practices such as adulteration is the killer of quality saffron in Jammu and Kashmir needs attention and proactive efforts from government agencies at multiple levels. Moreover, the findings of the present study offer the great opportunity for future research studies in highlighting the problems of saffron industry and development of farmer friendly interventions to take this heritage cultivation to the heights.

5. Conclusion

From the above results and narrations, it can be concluded that there is an urgent need to revamp the cultivation, production, marketing and grading of saffron in Kashmir. The restructuring has to start from growers' fields by practicing the modern ways of cultivation, keeping track of changes that happen in cultivation and creating efforts to make good output of the saffron. The government agencies concerned with saffron cultivation should provide access to the farmers to basic facilities and services like irrigation, training, soft loans, good quality of saffron corms, advanced tools and machineries. Data from other saffron producing countries like Iran and Spain has revealed that use of modern tools and technology can make huge changes in the production and processing of the crop. It is also needed to work constructively to remove the factors which are influencing the saffron cultivation and which act as barriers in the development and marketing of saffron spice. Here, there is need of initiating new policies and programmes to protect the saffron cultivation by providing good incentives to the cultivators and implementing the rules which prohibits the illegal use of saffron cultivation land in commercial and business purposes. The study has also implication for future research by focusing on good practices and developing intervention packages to streamline the production and marketing of this heritage cash crop.

6. Conflict of Interest

The authors declare no potential conflict of interest

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