



Production and Productivity of Saffron in Jammu and Kashmir

Ajaz Ahmad Dass
Research Scholar,
R.T.M.N.U, Nagpur

Dr. Sneha V. Deshpande
Prof & Head of P.G.T.D of Economics
R.T.M.N.U, Nagpur

ABSTRACT

Saffron cultivation confined to a limited geographical area in the State of Jammu and Kashmir is under stress reportedly due to cement dust pollution and land use changes. Besides, having tremendous medicinal values, Saffron has traditionally been associated with the famous Kashmiri cuisine and undoubtedly represents the rich cultural heritage of Kashmir. However, Saffron production is currently suffering on several counts; falling productivity and unscientific post-harvest management are the major concerns. Some other factors that are responsible for the decline of saffron industry in Kashmir are, lack of availability of good-quality corms as seed material, poor soil fertility, lack of assured irrigation, infestation by rodents and diseases, poor post-harvest management, improper marketing facilities and increased urbanization on saffron lands. This legendary crop is under threat of extinction and warrants collective attention of researchers, farmers and policy makers. As far as the economics of this crop is concerned, creation of the strong market demand is the biggest opportunity for its revival and needs a consortium of traders and producers to be established at the International level for market assurance and price stability. While the scientific aspect demands more work on genetic improvement and post-harvest technologies.

Keywords: *Saffron, Production, Productivity, Post-Harvest*

INTRODUCTION

Jammu and Kashmir is globally acknowledged due to its cultivation of world famous horticulture fruits. Horticulture sector is considered to be the back bone of the state economy. The State is industrially poor and

fewer avenues available in the public sector have made people depend on agriculture sector for their income and livelihood security. Horticulture is important sub-sector of agriculture in the state. Saffron is world famous high value low volume cash crop of the Kashmir. Saffron cultivation in Kashmir valley has its historical roots from Iran where world's largest amount (70 percent) of saffron is cultivated in the country. Jammu & Kashmir having monopoly in the saffron cultivation in India near by 7.3 percent of world saffron is produced in the State puts India on the third rank in world saffron production. Pampore area of Pulwama district produces almost 75 percent of total share of state. But during recently the area under cultivation, production productivity is on decline with the result the saffron cultivation is under threat in the state due to presence of lot of problems in the sector; on the other influence this sector is means of likelihood of large no of people. Government of India and state government has introduced National Saffron Mission for the rejuvenation and promotion of saffron cultivation in the state. The paper analyses the trends in saffron cultivation in terms of area production and productivity. Through light problems and the threats exists in the cultivation of the saffron in the valley. The information is basically primarily in nature it is collected from the saffron cultivators and mostly qualitative in nature.

Objectives

1. To examine the trends in Area, Production, Productivity of Saffron in J & K.
2. To study the factors for declining production.
3. To suggest measures for improvement of this crop.

Research Methodology

The study is descriptive in nature and is based on primary and secondary data. The primary data collection was mostly qualitative in nature. The secondary data was collected from horticulture department J&K, Horticulture planning and marketing department J& K, Agriculture and production department, central institute of temperate horticulture of the state and various published and unpublished articles and reports. Primary data was collected from a field survey of 100 households who were mostly involved in the cultivation of saffron from village Chandhara of district Pulwama that was randomly selected where people were mostly involved in the saffron cultivation. Households having land of 40 to 60 kanals were selected in the sample. Stratified simple random sampling and snowball sampling was used to locate the saffron cultivation households. The interview was held with the concerned households head related to practices and techniques in saffron cultivation. Information was collected related to problems and concerns in saffron cultivation. Information was also collected related to the Government efforts and the incentives for the cultivation of the saffron in the state. The information collected was mostly qualitative and descriptive in nature. The respondents were also asked about the Marketing channel of the saffron cultivation by the farmers.

Production and Productivity of Saffron in Jammu and Kashmir

Saffron is one of the important commercial activities of Indian agriculture and appears to be second largest industry after the fruit production in Jammu & Kashmir. Its cultivation dates back to 550 A.D. It is a legendary crop, an important component of culturally rich heritage of Kashmir and was used as an ingredient in Ayurvedic Medicines by the famous Kashmiri vaid (Vegbhatta and Sushtra).

Kashmir enjoys the distinction of occupying the largest area (5707 ha) under saffron in the world and has great potential for increasing its production and export to other countries. Once producing 173.82 q of saffron out of 5316 ha which by conservative estimates of Rs.250 per tola led to earn foreign exchange worth Rs.40 crores, the present production of 64.64 q and productivity level of 2.28 kg ha⁻¹ (2002) is far less

when compared to other saffron grown countries of the world like Iran, Spain, Italy producing 5-6 kg ha⁻¹ has been a matter of great concern. The area under saffron cultivation has also declined drastically 1998-2002 primarily due to failure of precipitation experienced during the active growing season of saffron and non-application of nutrients to soil which has resulted in enormous increase in the cost of seed corms thereby effecting the replantation rate in the conventional areas. In 2002 the area under saffron cultivation was hardly 2825 yielding 64.64 q.

Jammu & Kashmir enjoys the monopoly in the cultivation of saffron in the sub-continent. Saffron is a rain fed crop and is cultivated around Padampore (now Pampore) on the elevated (Karewa) topography where almonds are also cultivated and there is a symbiotic relationship for saffron-almond cropping system. The saffron growing areas are severely to moderately eroded soils located at an altitude of 1600-2100 masl. The Karewas are reported to be of lacustrine origin of Pleistocene and post-Pleistocene. These soils are placed in the alsi soils and their colour varies from brown to yellowish brown, besides being slightly alkaline in nature. The organic carbon, available nitrogen and phosphorus of these soils are low to medium whereas available potassium is medium to high. The main areas of saffron cultivation are Zeewan, Balhama, Khunamu, Yachnambal (Srinagar) Khrew, Ludoo, Dussu, Konibal, Chandaha, Namblabal, Barsu, Lethipora, Sambora, Waantipora, Nagam, Sarwin, Hapthnar, Kakewring, Charar-e-Sharief and Kishtwar (Doda). 78.91 per cent of the total area under saffron cultivation is in the district Pulwama, followed by district Budgam (12.27%), Srinagar (7.32%) and Doda (1.5%).

More than 10000 farm families of 226 villages are associated with the cultivation of this crop, directly and indirectly and nearly 85 per cent families associated with its cultivation are categorized into small and marginal farmers, living below the poverty line. Most of the cultural and post-harvest operations are primarily done by farm women who contribute 65 to 70 per cent of total labour component.

Table 1: Trends in Production Area and Productivity of Saffron in J & K

S. No.	Year	Area in (Ha)	Production in (MTs)	Average Productivity (kg/ha)
1.	1997	5707	15.95	2.8
2.	1998	4161	12.88	3.13
3.	1999	2880	7.65	2.27
4.	2000	2742	3.59	1.88
5.	2001	3075	0.3	1.57
6.	2002	2989	6.5	2.96
7.	2003	2928	5.15	1.66
8.	2004	2436	6.86	3.75
9.	2005	3110	7.04	1.63
10.	2006	3130	6.5	2.25
11.	2007	3010	8.2	2.15
12.	2008	3000	7.7	2.5
13.	2009	3280	9.46	2.34
14.	2010	3785	9.55	2.5
15.	2011	3790	9.85	2.52
16.	2012	3674	10	2.72
17.	2013	3674	11.5	3.13
18.	2014	3674	15	4.08
19.	2015	3674	9.6	2.61

Source: Financial Commission (Rev.) Jammu & Kashmir.

REASONS FOR DECLINING TREND: PRODUCTION PRACTICES

1. The production system currently followed in Kashmir is responsible for the lower productivity of Saffron. In Iran and Spain, farmers use the pluri-annual method of cultivation, under which Saffron plants are left in the soil for two consecutive years, after which corms are removed from the field for fresh plantation' Graded corms weighing 8 gm and above are preferred for new plantations. Corms are irrigated during the months of September and October using sprinkler technology which ensures timely corm sprouting and good flower yields. Saffron is dried using toasters / electrical dryers/vacuum dryers, which enhances the quality of Saffron.
2. In J&K. farmers have traditionally adopted longer planting cycles (> 15 years)' Unsorted corms of different grades are used for fresh plantation. The corms are not uprooted except when new planting is done to use the daughter corms as seed material- Water is a critical factor for productivity since Saffron is a rain-fed crop of Karewas (highlands) where irrigation sources are generally not available.
3. A large number of Saffron fields have become senile on account of low plant population. Scientific studies have established that biotic stress on account of longer planting cycle is the main cause of low productivity. The major biotic stress faced by Saffron for several years is 'corm rot fungal infection'. However, farmers do not adopt any

systematic control measures to prevent this infection. Rodents and field rats also pose a serious Problem.

4. After plucking of flowers, the stigmas are separated by family labour and sun dried. This results in sharp degeneration in quality, leading to non-standard products. The fundamental reasons for poor quality are (i) poor post-harvest handling practices (ii) lack of proper infrastructural facilities, such as pack houses' (iii) packing of dried product in poly bags which are stored under room temperature by the farmers. Saffron remains in such packing till the product is sold to the wholesale traders' which may take between one to six months, and sometimes even year after drying and packing'
5. 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. The main marketing channels are brokers, local traders, agents, cooperative societies, government agencies and companies. Since the broker is the main stay of the marketing channel. There is rampant exploitation of farmers mainly due to ignorance regarding the prices prevailing in major trading centers.
6. During the last decade, Saffron prices have witnessed wide fluctuations. During 1999 to 2006, prices generally hovered in the range of 30,000 to 47,000 per kg. However, prices now are higher. During 2008-09, the average domestic price was < 2.70 lakh/kg.
7. Even though domestic production is not sufficient to meet demand, India does export Saffron in small quantities. During 2009-10, India exported around 1.5 tons of Saffron. As a result of strong domestic demand, domestic prices went up from 0.30 lakh/kg to < 2.70 lakh/kg (current price), which has discouraged export of Saffron. The quantity imported is merely 0.3 tons (< 480 lakh). It is believed that a substantial quantity of Iranian Saffron enters the country clandestinely, and is mixed with the local produce and sold as Kashmiri Saffron.
8. Strong domestic demand and high domestic prices are supporting factors to revitalize Saffron cultivation in J I K. As per trade estimates, domestic demand is in the range of 20 MT per annum, while current domestic production is in the range of only 10-15 MT. Hence, it is desirable to focus on productivity enhancement, improvement of post-harvest processing and transparent marketing.

INITIATIVES FOR PRODUCTIVITY BOOSTING

In order to address issues relating to decline in saffron production, productivity and quality, research organizations at international level have developed relevant production, protection and post-harvest technologies to achieve high productivity. The strategies recommended for realizing higher yields includes the following.

PRODUCTION

Good agricultural practices involving plantation of graded c work being done for promotion of saffron farming as anorms (> 8 g) with inter and intra row spacing of 10 × 20 cm, improving soil health through supplementation of well rotten FYM, Vermicompost, biofertilizers and inorganic fertilizers, water scheduling during critical stages of crop growth from August to October (sprouting to flowering), management of diseases, pests and weeds using mancozeb, carbendizime Zinc Phosphide and Aluminium Phosphide and saffron mechanization, ensures high factor productivity and high income per unit area.

POST-HARVEST MANAGEMENT

Post-harvest technologies for higher saffron recovery and better product quality are available for better economic returns. Traditional post-harvest practices are responsible for quality degradation and low saffron recovery. To make industry more profit earning and consumer friendly, adoption of new technologies, ensuring flower picking at appropriate time in a proper collection material at an appropriate age, quick stigma separation within 10 h of flower picking, followed by quick drying using hot air/solar or vacuum dryers is imperative as picking of aged flowers, delayed stigma separation and delayed drying under sun or shade leads to biodegradation of crocin to crocetin and thus lowers saffron recover by about 30% and quality by 50%.

IN VITRO MICRO PROPAGATION

Triploid nature of saffron restricts use of conventional breeding procedures for its genetic improvement. Vegetative propagation is the only route for mass multiplication of corms. One of the possible recourse to produce quality corms and to overcome the problems of corm rot (due to infection by several fungal pathogens) together with low rate of multiplication is application of micro propagation technique like tissue culture. The technique, however, calls for development of convenient protocols and their standardization that will not only help in mass multiplication of elite-disease

free clones but also open new vistas for application of recombinant DNA technologies for development of transgenics in this crop. SKUAST-Kashmir has developed *in vitro* protocol for mass multiplication of corms using corm slice as an explant. The explant develops sprouts, shoots and mini corms when inoculated on Murashige and Skoog (MS) medium supplemented with different concentration of BA, NAA, sucrose and paclobutazol or CCC.

CONCLUSION

Saffron production is confined to a limited geographical area in the State. Saffron has traditionally been associated with the famous Kashmiri cuisine, its medicinal values and its rich cultural heritage of Kashmir. Its role in enriching the local cuisine, its medicinal value and its use in important religious rituals is well known. However, Saffron production is currently suffering on several counts, especially those relating to productivity as well as post-harvest management. This has resulted in lower production and poor quality. There are reports that several farmers are abandoning Saffron cultivation in favour of other crops.

Saffron cultivation in Kashmir is under threat of extinction. This is evident from its dwindling share in global production. Area under Saffron cultivation has declined from about 5707 ha in 1996 to just 3715 ha in 2009-10 and further to 3674 ha in 2015. Productivity has also declined from 3.13 kg/ha to 2.50 kg/ha in the last few years.

References

- 1) Akowuah, G. A. & Htar T. T. (2014). Therapeutic properties of saffron and its chemical constituents. *Journal of natural products*, Vol. 07 (2014):05-13.
- 2) <http://www.fao.org/giahs/giahsaroundtheworld/designated-sites/asia-and-the-pacific/saffron-heritage-of-kashmir/en/>
- 3) <http://www.greaterkashmir.com/news/gk-magazine/saffron-mission-facts-and-figures/127389.html>
- 4) Husaini, A. M., Bhat, M.A., Kamili, A. N., & Mir, M. A. (2013). Kashmir saffron in crisis. *Current science*, Vol. 104(6), pp 686-687.
- 5) Imtiyaz-Ul-Haq and Sahina S. (2014). Economic Analysis of saffron cultivation in Kashmir Valley of India. *European academic research*, Vol. II (I) pp 653-685.
- 6) Kafi, M., & Showket, T. (2007). A comparative study of saffron agronomy and production systems of Khorasan (Iran) and Kashmir (India). *Acta Horticulturae*, 739, 123.
- 7) Nehvi, F. A., Wani, S. A., Dar, S. A., Makhdoomi, M. I., Allie, B. A., & Mir, Z. A. (2006, October). New emerging trends on production technology of saffron. In *II International Symposium on Saffron Biology and Technology 739* (pp. 375-381).
- 8) Nehvi, F. A., Wani, S. A., Dar, S. A., Makhdoomi, M. I., Allie, B. A., & Mir, Z. A. (2007). Biological interventions for enhancing saffron productivity in Kashmir. *Acta Horticulturae*, 739, 25.
- 9) Saffron heritage site of Kashmir in India, GIAHS Saffron Site Report (Part-2) 31st May, 2012.
- 10) Sampathu, S. R., Shivashankar, S., Lewis, Y. S., & Wood, A. B. (1984). Saffron (*Crocus sativus* Linn.)—Cultivation, processing, chemistry and standardization. *Critical Reviews in Food Science & Nutrition*, 20(2), 123-157.
- 11) Various Photographs and information collected from internet are duly acknowledged.