Indigenous Knowledge and Ethnobotany Associated with Saffron (*Crocus sativus* L.) in Kashmir

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India is amongst the richest ethnobotanical treasure in the world, which must be fully documented, utilized and conserved. Dried stigma of Saffron (*Crocus sativus* L) flower is used for different purposes. It has got more than 85 species, distributed from Mediterranean region to Indian subcontinent. During an exploration in the Kashmir valley, information on indigenous knowledge and ethnobotany associated with saffron were gathered along with diversity collection. Data were also collected on socioeconomic status of the growers. Information gathered revealed that it is used as a spice, food additive, cosmetic, coloring agent and medicine in different systems (Ayurveda, Unani, Tibestian and Chinese system) and in religious functions. Indigenous uses of saffron are briefly discussed as described. Being the most expensive spices, quality and adulteration aspects are also addressed in this paper.

Key words: Indigenous Technical Knowledge, Ethnobotany, Saffron (*Crocus sativus*), Exploration, Landraces

Introduction

Saffron (*Crocus sativus* L.) is probably the most precious and most expensive plant species in the world. Its filaments or threads are actually the dried stigmas of the saffron flower. The quality of saffron is dependent on its colouring power (crocin concentration), odour (safranal) and taste (picrocrocin). The best quality saffron has a high safranal content. Essential oils are responsible for its therapeutic properties (Sujata *et al.*, 1992). The name saffron comes from Arabic word, where the spices are known as Zafran. Eastern Greece is said to be the origin and today it is cultivated from the Western Mediterranean (Spain) to India (Kashmir). Saffron is known by various names in different Indian language like Keshar in Hindi, Kunkumam in Sanskrit, Kunkumppu in Tamil Kunkumakesari in Kannad, Kunkumappuvu in Malayalam and Kunkumapuvvu in Telugu. Saffron is one of the ancient plant species in the world. *Crocus sativus*, known as a wild plant, is considered to be a mutant that has derived from *Crocus cartwrightianus*. The cultivated clone was probably selected for its triploid vigour and extra long stigmas and has been maintained in cultivation for over 3000 years. Saffron (*Crocus sativus* L.), a member of large family Iridaceae, comprising some 85 species is well adapted to cold winter with autumn–winter–spring precipitation and warm summer with very little rainfall. The plant being in active growth from autumn to late spring and survives the summer drought, below ground by means of compact corm. Above ground growth commence with the onset of autumn and flowers almost immediately producing their leaves and flowers. Saffron is a bulbous, autumn-flowering, perennial of the iris family (Dhar *et al.*, 1988). The flowers have three bright, orange-red stigmas, which are the true saffron. The three stigmas are handpicked from each flower, spread on trays, and dried over charcoal fires for use as a food flavouring and coloring. About 1,65,000 to 1,75,000 flowers are needed for producing one kg of saffron. Saffron contains 0.5 to 1.0 per cent essential oil, the principal component of which is picrocrocin. The colouring matter of saffron is crocin only. In India, its commercial cultivation is mainly confined to Kashmir valley, about twelve kilometer from Srinagar, near Pampore on the banks of the Vitasta (Jhelum) behind the small mountains. In addition to Pampore, saffron is also grown in sizeable area in Kishtwar valley of Doda district, Jammu division (Nauriyal and George,1977). Though the area under saffron cultivation dramatically fluctuates in India i.e. in the state of Jammu and Kashmir and varies from 240 ha to 2440 ha. However, the saffron trade takes place in India from Pampore, Srinagar and New Delhi. This study was undertaken with an objective to gather the Indigenous knowledge, ethnobotany and indigenous technical knowledge (ITK) associated with saffron crop.

Materials and Methods

Plant exploration is the quickest instrument to provide genetic diversity for crop improvement programmes. To collect *Crocus* germplasm available in the Kashmir valley, an exploration was conducted from August 16 to 19, 2001. In this area local varieties of saffron are under cultivation and their names are based on the name

of a village, person, mountain, river etc. This exploration was a part of National Agricultural Technology Project on Plant Biodiversity, conducted by National Bureau of Plant Genetic Resources, Regional Station, Srinagar, Jammu and Kashmir. Area surveyed and explored included Srinagar (Sanatnagar and Rangreth) (34N 06 74E 48), Charar-e-Sharif (74E 46 33N 52) and Ananatnag (33N 44 75 E 09). During the exploration and collection of saffron germplasm, we also collected information on indigenous knowledge, ethnobotany and indigenous technical knowledge associated with saffron crop along with socioeconomic status of saffron growers of Kashmir valley. For the purpose of acquiring information as mentioned above, we prepared a questioner for all possible information regarding their knowledge on saffron uses, cultivation practices, major problems faced by growers, their holding etc. In the process of gathering information, we interacted with more than 100 farmers, which were actively engaged in saffron cultivation or trade in one or other ways.

Results and Discussion

The area surveyed is famous for saffron growing. The details of Saffron germplasm collected during the exploration and indigenous technical knowledge (ITK) collated from growers are presented below.

i) Diversity in Saffron Germplasm

A total of 28 accessions were collected comprising 11 accessions from Pampore, 5 accessions from Charreshareef, 6 accessions from Khannabal and 6 accessions from Rangreth. Maximum corm weight was 28 g and minimum 12 g, both the accessions belonged to Pampore. Location wise Pampore has got maximum diversity in relation to corm weight. However, we found variation in size (diameter) and shape of the corm ranging from near round to oval /oblong. Colour of pericarp (skin) also exhibited diversity that ranged from light brown to light red.

ii) Socioeconomic Status of Saffron Growers

Although the terrain of Jammu and Kashmir is highly diversified, only a small portion of its total area of approximately 85,000 square miles (220,000 square km) is well suited to human settlement. Of particular note is the fertile Valleye of Kashmir, a valley roughly 80 miles long and up to 35 miles wide (130 × 55 km) astride the upper Jhelum River. This densely settled and surpassingly beautiful area lies at an average elevation of approximately 5,500 feet (1,675 m). In normal times, it supports an economy based on tourism, handicraft industries and intensive agriculture. The area, which is not under cultivation, support rich stands of mainly coniferous forest. According to the 2001 census, the population of Indian Kashmir is 10, 069,917 with a density of 256 persons per square mile.

iii) Saffron Soils and Major Constraints

Saffron is grown on marginal and poor soil by small and marginal farmers. As per information received from farmers, lack of improved varieties is single major constraint resulting in poor production and productivity and fluctuating area under this crop. Lack of mechanization is another problem associated with this crop, as majority of operation is done manually.

iv) Indigenous Technical Knowledge (ITK) Gathered from Farmers

The fact is that Indians in general are crazy about this exotic spice. In India, to serve dishes laced with saffron is regarded as mark of honour to the guest and have become the norm rather than an exception. Indigenous uses of saffron in different parts of world are mentioned here first by people of Kashmir then other parts of India and in the last brief account of some other countries, which also consume saffron since long time (Sharma 1999). Some useful Indigenous Technical Knowledge (ITK) collected during the exploration is presented here. The use of saffron is grouped into two category i.e. local medicine, other uses and in the preparation of different dishes, which are made on special occasion. A few of them are listed here.

a) Indigenous Uses

Use of Saffron in Kashmiri Local Medicine and Other Uses

- As a facial cream for decolouring of skin
- To cure skin disease, fever
- Colouring agent
- Used in rituals and religious functions
- To prepare stimulant and tonic
- Useful in bronchitis, cold and cough
- Carminative and diaphoretic
- Saffron is sprinkled on the various occasions
- Above ground vegetative part is used as fodder

Use of Saffron in Different Indian Dishes

This spice is also widely used in sweet recipes like kheer, rasmalai, Indian yoghurt drink (lassi), butter lassi

(makhaniya lassi) milky rice or vermicelli puddings and sweet custard-like desserts from India. It is an essential commodity in high quality milk/ cream based confectioneries and Mughlai dishes in India wherein it imparts a rich colour and distinct flavour. It flavors baked goods and is one of the ingredients in the liqueur, Chartreuse. It is used in sedatives, as an antispasmodic and for flatulence. It is also used in perfumes and dyes. (Mehta *et al.*, 2002). In Kashmir it is widely used for preparation of ***Kehawa:*** A drink prepared for stimulant, in which saffron is one of the major constituents;***Tea:*** Saffron is also a chief ingredient of tea of high esteems; ***Wajwan:*** A group of non-vegetarian dish prepared to serve during the marriage party in Kashmir, in which saffron is one of the major spices; ***Sewai:*** A sweet preparation in which saffron is also used prepared during 'Id' festival; ***Biryani:*** A non-vegetarian dish in which saffron is principal constituent of spices.

b) Ethnobotanical Uses

Due to the large number of experienced users in India and the frequency of use also being very high, the consumer in India is very discerning. Saffron finds a variety of uses in India and abroad. In India, it is used as herb in Ayurvedic Medicines, which heal a variety of diseases ranging from Arthritis to Impotence and Infertility. Here is the list of a few uses where saffron is put to medicine as a cure and as a preventive. The list is just to give an idea of the usefulness of this exotic herb (Maheswari 1996; Sharma 1999).

c) Saffron in Indian Indigenous Medicine System

Saffron in Ayurveda

- Curing Asthma and Cough
- Useful in Colds
- To treat Alcoholism
- To treat Acne and Skin Diseases
- To prepare Chyawanprash

Saffron in Unani Medicine

- Used in medicines that reduce inflamation
- For treatment of enlarged liver and infection of urinary bladder and kidneys
- As an ingredient in recipes useful in menstrual disorders
- For strengthening the heart and as nervine tonic
- As a diuretic if soaked overnight in water and administered with honey
- Pounded with clarified butter (ghee) it is used for treating diabetic patients.

v) Documented Properties and Actions

There is a long history of the use of saffron in the Indigenous medicines of many cultures. As a result of a variety of recent scientific investigations, there is now convincing evidence for the biological activity of saffron and its constituents. One of the activities of saffron, which has the greatest potential in medical applicability, is its ability to inhibit carcinogenesis. A number of recent studies have shown that saffron extract possesses antitumor activity against transplanted tumors and anticarcinogenic activity against chemically induced carcinogenesis *in vivo*, and cytotoxic effects on tumor-derived cells *in vitro*. These findings have raised the possibility that natural saffron and/or some of its constituents might be used as alternative antitumor or anticarcinogenic agents, either alone or in combination with synthetic substances having anticancer activity (Nair *et al.*, 1996 and Nair *et al.*, 1992). The recent scientific findings on the biological activities of saffron, for its therapeutic activity against a number of diseases, provide strong indications that saffron and/or its components may be useful agents in modern medicine.

Saffron Properties Documented in Indian Ancient Literature:

A brief account on saffron properties and their uses in Indian medicine system and other occasional uses documented in different Indian ancient literature are cited here.

Kunkumam ghusrnam raktam kashmiram piakam varam

Sankocham pisunam dhiram vahnikam sonitabhidham ***(Bhavaprakasam)***

Kunkumam katukam tiktam usnam slesmasamirjit

Varndrishtishirorogavisahrt kayakantikrt ***(Dahnvantarinighantu)***

Snigdhosnam vatasamanam varnakrddehagandhakrt

Kunkumam rasatastiktam kasayam krminasanam ***(Madanadinighantu)***

vi) World Wide Indigenous Uses of Saffron

It is known to have aphrodisiac properties and is widely used in Asia and the Middle East as such. Chinese and Tibetan system of Medicine also find many uses of this exotic herb. Ancient Greeks demonstrated the infinite wealth of the gods by describing *Zeus* having a bed of saffron. Knossos on Crete had frescoes of

a man gathering saffron. The Egyptians cultivated vast fields of it to mix with honey, and Romans sought saffron as a curative and aphrodisiac. Wealthy Romans sprinkled their marriage beds with saffron. In the Middle Ages, saffron traveled across North Africa, along with Islam, into Spain. Medieval Spain quickly became the center of saffron production. Not only was saffron used as a medieval flavoring, but scholars as notable as Roger Bacon claimed that saffron would defray the effects of aging and add to the joy in one's life. A native of the Mediterranean, saffron is now imported primarily from Spain, where Moslems had introduced it in the 8th century along with rice and sugar (Maguelonne, 1992).

vii) Saffron in Western Medicine

In the western world it is used primarily as a spice. But it is also discovering its uses as a health tonic that naturally does not have side effects. About 50 mg of Saffron dissolved in a glass of 200 ml milk and a spoonful of sugar makes a very tasty drink that is also a health tonic. A regular intake of this every day for a period of time enables the body to build resistance against a lot of common diseases such as Asthma, and Common colds as claimed by Ayurvedic Practitioners (Abdullaev 1993 and Basker and Negbi, 1983). It is essential to have a regular intake for it to be effective.

viii) Saffron Varieties in Indian Ancient Literature

Saffron is cultivated by means of corm and as such no commercial variety has been released by any agency /research organization. Bhavaprakasham has mentioned three varieties of Indian saffron (kunkumam) viz., Kashmir, Baluchistan and Persian, which are based on geographical region. Of which the Kashmir variety is reported to be superior one (Sala 1994).

ix) Saffron Varieties in Modern Trade

As such no variety has been released for cultivation. It is propagated by vegetative means. But in world trade there are some varieties. These varieties are totally based on geographical boundaries. A few of them, which have wide impact in saffron trade, are discussed briefly (Negbie1999).

Kashmiri Mogra Cream Saffron: Saffron of Indian (ie. Kashmir) origin is acknowledged to be the finest in the world. The dark red color and long perfect strands are as beautiful as they are colorful and flavourful. It is very rarely available outside India because of its high cost and the fact that Indians hardly leave any to be exported, consuming nearly the entire produce. India is the largest consumer of Saffron having knowledge of its benefits since ages. Thus, the high standard of its quality is not very well known outside the Indian sub-continent. Kashmir Mogra Cream Saffron is truly wonderful.

Spanish Coupé: Saffron is the top grade of the Spanish Saffron crop. Extra hand labour is used to remove every bit of the yellow saffron style material, leaving 100% beautiful pure red saffron threads -hence the name: coupé means, "to cut", as in cutting off all the yellow bits. Spanish Coupé Saffron is a truly excellent crop, especially nice for the Indigenous Spanish dishes.

Spanish Superior: It is the most widely available saffron and is a very good crop. Spanish Superior Saffron has a bit of the yellow style material left attached to some of the saffron stigmas, so it is not quite as strong as Spanish Coupé or Kashmir Indian Saffron.

Iranian Saffron: In Iran the style is still attached to the stigmas, they are almost always in a loose tangle. The main difference being in the yield of stigmas which is about 75%.

Mancha Saffron: Common brand name for Spanish saffron grown in the five provinces of the La Mancha region of southeastern Spain. This name should not be taken as a direct reference to the quality of the saffron as coloring strength is the only way to measure saffron quality scientifically.

American/ Mexican Saffron: Refers to the thistles of the flower heads of the safflower plant, which grows wild all over the US, and Mexico. The red-orange thistles, produce a slight yellow dye but no saffron flavor or aroma in cooking or baking. Those unfamiliar with saffron's real qualities sometimes mistake these thistles, sold very inexpensively in packages sometimes labeled "saffron" for saffron stigmas.

x) Commercial Saffron

No one can dare to ignore saffron easily without amazed by its uniqueness in the spice world. Saffron has an aroma and flavour which cannot be duplicated, and a chemical make-up which, when understood, helps the chef or home cook to know how to best release that flavour and aroma in cooking and baking. Saffron is sold in two forms, powder and threads. Commercial saffron comes from the dried (cured), bright red stigmas of the saffron (*Crocus sativus*). Each red stigma is like

a little capsule that encloses the complex chemicals that make up saffron's aroma, flavor, and yellow dye. In order to release these chemicals, one must steep the threads. Powdered saffron is more efficient because it does not need to be steeped provided that if not adulterated.

xi) Saffron Qualities and Adulteration

Saffron is grown commercially in India, Spain and Iran. Though it is also grown in a few other European Nations, the production there is negligible. Of these the Spanish variety always has a portion of yellow (style) attached to the red thread (the stigma). In Iran the stigma is very thin and small in size and the saffron is of two basic varieties. One contains only the stigma (red) part without the yellow style and the other is a bunch wherein the full style is attached to the stigma and tied in a bunch of several hundred stigmas with their styles. The effective yield of Saffron in this quality is only about 50% of red stigmas. The male parts of the saffron flower, the stamens, are half the size of the stigmas, and are deep yellow and have no culinary value. Unfortunately, they are sometimes added to the red stigmas to increase the weight of commercial saffron. Ground yellow stamens is sold as powdered saffron. Legitimate powdered saffron is red-orange and is made by grinding saffron stigmas. Under no circumstances pure powdered saffron would have any shade of yellow. (Narasimhan *et al.*, 1992: Sujata *et al.*, 1992)

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