

Saffron: The Wonder Crop of Kashmir

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Introduction

Saffron is the most expensive spice in the world, popular for its unique aroma and brilliant colour. Besides being used in cuisines as a flavoring and colouring agent, saffron has several pharmaceutical uses owing to its numerous medical benefits. Kashmir's saffron retains a high reputation across the globe and is locally referred to as 'Kong', 'Zafran', 'Kesar' etc. It is believed to have been brought into Kashmir by immigrants from central Asia. The saffron spice is actually the dried stigma of the flowers of 'saffron crocus' (scientifically *Crocus sativus*). This flower, vernacularly called 'Kong Posh', symbolizes freshness and purity. About 2,50,000 crocus flowers are to be harvested so as to acquire one kilogram of saffron. It is often referred as 'Red Gold' by virtue of its intense colour and exorbitant prices ranging from 1500 to 2200 Euros per kg (Mykhailenko *et al.*, 2020).

The crop is believed to originate from Persia (today's Iran) and is distributed across central Asia, Mediterranean regions, Asia, Europe, northern Africa and North America. The global saffron market was valued at 374.6 US dollars in 2020 and is set to reach 721.5 million US dollars by 2028 (Anonymous, 2021). At present the worldwide production of saffron is approximately 300 tons per annum (2020-21). Iran, being the largest producing country, contributes 90% of the total production (430 tons in 2019) (Shahbandeh, 2020). Other saffron producing countries include India, Greece, Afghanistan, Morocco, Spain etc. In 2019, India escalated to become the second largest saffron producer (22 tons) in the world (Shahbandeh, 2020). The UT of Jammu and Kashmir is the largest saffron producing area in India, with a production of 13.36 Mts from 3,715 hectare area during 2020-21 (Mukeet Akmal, 2021). Pulwama, Budgam, Srinagar and Kishtwar are the main districts where saffron is being commercially cultivated, while Pampore is the hub of saffron cultivation in Kashmir. In Kashmir, saffron grows well at elevation of 1500-2000 m above mean sea level

and on soils of 'Karewa' which are the flat-topped lacustrine deposits. The flowering of saffron crocus is markedly influenced by the prevailing temperature and photoperiod.

Crocus sativus is a small perennial autumn-flowering herb belonging to the family Iridaceae. It is a sterile triploid and is considered to be a mutant of the east Mediterranean *Crocus cartwrightianus* (wild saffron). Saffron crocus grows up to 15 to 30 cm in height and bears delightful lilac-mauve coloured flowers. As a consequence of being a sterile triploid, saffron naturally propagates vegetative through corms. A corm is overlaid with dry outer sheath called 'corm tunic' and the corm lasts for only one year dividing into 'cormlets' which generate new plants afterwards. The saffron flower possesses a three-pronged style and each prong bears a crimson-coloured stigma which is the commercial part of the crop. The plant may live up to 10-15 years, however it is advisable not to retain for more than 5 years under commercial cultivation. Under Kashmir conditions, saffron plant undergoes a dormant phase starting with senescence in spring and extends up to late summer or early autumn (i.e. April to September) (Husainiet al., 2010). The above ground part remains fully dormant all summer. Next is the flowering phase which occurs during the autumn (i.e. October to November) and subsequently the vegetative stage which starts immediately after flower and lasts for almost six months (i.e. November to April) (Husaini et al., 2010). The vegetative phase is the most crucial as it is important for the formation of replacement corms and also since vernalization requirements are met in this phase only (Yasmin and Nehvi, 2018).

The essential oil content in saffron is about 0.5 to 1%, which contains more than 150 volatile compounds (Kosar et al., 2017). 'Picrococin' and 'Safranal' are mainly responsible for the flavour and aroma of saffron respectively. It is during the drying and storage of saffron that picrococin gets hydrolyzed to form safranal. Besides, there are many other non-volatile carotenoid compounds present in saffron. 'Crocic' and 'Crocetin' are the carotenoid pigments responsible for the crimson colour of saffron strands, whereas the golden yellow-orange colour of saffron is mainly due to α crocin. Owing to its high crocin content and intense aroma, Kashmiri saffron remains superior over the saffron from Spain or Iran and as such sells for premium prices over the globe. Saffron also exhibits a high antioxidant property which is mostly due to the presence of crocin. Besides, crocetin, safranal, kaempferol etc. are other important antioxidants present in saffron. Traditionally, extracts and tinctures made of saffron have been used for treating several ailments. Some remarkable



medical properties attributed to saffron are: antispasmodic, eupeptic, sedative, carminative, aphrodisiac, diaphoretic, expectorant (José Baguret *al.*, 2018) etc. It is also known to possess anti-cancer properties, treat depressive and PMS related symptoms, lower blood sugar, reduce the risk of heart diseases, reduce appetite and help in weight loss etc. Not only that, but saffron in the form of drug supplements has shown to reduce COVID-19 symptoms in patients.

However, there are certain constraints that saffron cultivation in Kashmir faces especially due to market uncertainties, lack of good planting material, lack of assured irrigation, poor soil fertility etc. Marketing is a major bottleneck, as the farmers face inconveniences in selling small quantities of produce. A number of diseases like corm rot, dry rot, root rot, bacterial rot, ring rot, charcoal rot, mosaic etc. add to the problems of cultivation. In its endeavour to augment saffron production in the region, the government initiated the 'National Mission on Saffron' during 2010-11. In 2020, the mission was revived to expand saffron cultivation in north-eastern parts of the country as well. In the same year, saffron produced in Kashmir was issued the certification GI (geographical indication) registration by the government, hence securing its position on the global map.

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