

Investigation the Saffron production in Iran

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Abstract: Saffron is a native plant of Iranian plateau. Iran with more than four-fifths of global production, has the largest share producer and exporter of saffron in the world market. Annual nearly 270 ton of saffron are produced worldwide, of which more than 240 ton belonging by Iranian farmers. After Iran, countries such as: Greece (7.5 ton), Morocco (2.3 ton), India (2.3 ton), China (1 ton) and Spain (1 ton) are the most producers in the world, respectively. The total number of saffron farmers in Iran is nearly 150000 farmers. The average acreage of Iranian saffron in a growing trend in recent years has been reached from 18000 hectares to 76000 hectares. But unfortunately, the yield per hectare of saffron production in Iran has declined from about 7 kg to 3 kg per hectare. The result of this study showed that with investigate to condition requirements to saffron plantation in Iran, saffron had a good condition to develop this crop to achieve of sustainable agriculture in Iran.

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Introduction

Agriculture is the most important economic sector of many developing countries. Agricultural production systems are expected to produce food for a global population that will amount to 9.1 billion people in 2050 and over 10 billion by the end of the century (UNFPA 2011). Agriculture is considered a critical sector in the world economy. It contributes 24% of global Gross Domestic Product and provides employment to 1.3 billion people or 22% of the world's population. In many of the developing countries, increasing agricultural production has been one of the most important priorities for agricultural development programs. Sustainable agriculture as a practice that meets current and long-term needs for food, fiber, and other related needs of society while maximizing not benefits through conservation of resources to maintain other ecosystem services, functions, and long-term human development. It is now understood that agriculture can negatively affect the environment through overuse of natural resources as inputs or through their use as a sink for waste and pollution (Dobbs and Pretty, 2004). Agricultural sustainability is not about technical fixes and expertise. It is development processes that need to integrate ecological and societal knowledge through changes in policy, institutions, and behavior. A successful program of sustainable agriculture includes goals such as providing food security with quality, water, soil and natural resources conservation, biodiversity, conservation of energy resources inside and outside the farm, maintenance and improvement in ranch profitability, being accepted by the community and improving the quality of human life (Shariatzadeh, 2012). Key features of agricultural sustainability include an

acceptance of the fact that agricultural strategies should be based on more than simple productivity criteria, that externalities are of great importance, and that intra- and inter-generational equity are key parameters in assessing agricultural change (DFID, 2002). The concept of agricultural sustainability has emerged in response to concerns about the adverse environmental and economic impacts of conventional agriculture. Despite the diversity in conceptualizing sustainable agriculture, there is a consensus on three basic features of sustainable agriculture (Rasul & Thapa, 2003):

- (i) Maintenance of environmental quality,
- (ii) Stable plant and animal productivity,
- (iii) Social acceptability (Hatami and et al, 2012).

Saffron Plantation Site Requirements

Climate: Mild winters with heavy snowfall and hot summers.

Temperature: Saffron grows well under temperate and dry climates; its vegetative growth coincides with cold weather and freezing condition. Saffron tolerates maximum of +45°C and minimum of -18°C.

Moisture: Annual rainfall requirement for saffron is about 300 mm. Maximum water requirement is in March and April of about 15 to 20 liters per m² per irrigation period.

Soil: Saffron can be grown in a wide range of soils, with moderate structure and good infiltration. But for better growth and production, soil should be sandy loam, rich in calcium and high content of organic matter.

Approximately 11% of the total land area of the Iran is used for crop production. Of this area, annually, about 12.7 Mha is cultivated (irrigated plus rainfed) and nearly 5.8 Mha is left as fallow. An estimated area of 32 Mha of unused land of Iran is potentially suitable

for crop production, but shortage of water resources on these lands limits their role in agriculture. The agriculture contributes just over 20% to the gross national product (GNP) and employs a third of the labor force. Saffron (*Crocus sativus* L.) as the most expensive agricultural and medicinal plant has a unique status among industrial and export products. Today, with %60 of the universal production, Iran is considered the main producer of Saffron in the world. Saffron's numerous qualities and uses together with the role it plays in the economy of Iranian farmers call for a particular attention to eradicate problems regarding its production, export and merchandising. In Iran it is specially an exceptional product, because it require little water and low care. It can provide jobs for villagers and prevent their emigration from country to cities (Golmohammadi, 2014).



Iran is leading country in saffron production with 76000 ha cultivated area (Fig 1) and 240 ton annual production (3.4 kg ha⁻¹ yield). Harvest index of saffron is less than 0.5% compared with 30 to 60% for other crops (Sepaskhah and Kamgar-Haghighi, 2009). The main saffron production areas in Iran are located in Khorasan, Fars and Kerman provinces. Its cultivation area increased by an annual rate of about 22% in last decade, however, its annual production increased by about 14%. This indicates that the saffron yield (kg ha⁻¹) decreased about 50% that may be due to occurrence of drought and newly cultivated fields with low yield (Ebrahimi, 2013).

The average performance varies in Morocco is between 2 to 2.5 Kilograms. In Italy, the average performance has been between 10 to 16 Kilograms per hectare, in Spain, it is between 6 to 29 Kilograms per hectare, in Greece, it is between 4 to 7 Kilograms per hectare and in India, it is between 3 to 7 Kilograms per hectare (Fig 2). However in Iran, performance per unit area is lower than these values (Safdari and Motiee, 2012).

In Europe however, especially in the Mediterranean basin, saffron production faces a crisis. The production of saffron has decreased due to a rise in labor costs, making production unprofitable, in spite of its high market price (Lage and Cantrell, 2009). On the other side, according to the report of trade promotion organization of Iran, the overall production in 2012 was more than 240 ton (Fig 3). Meanwhile the domestic price of this crop increased sharply (from 300\$/kg in 2005 to more than 4000\$/kg in 2010) (Sheykhdavodi and et al, 2010).

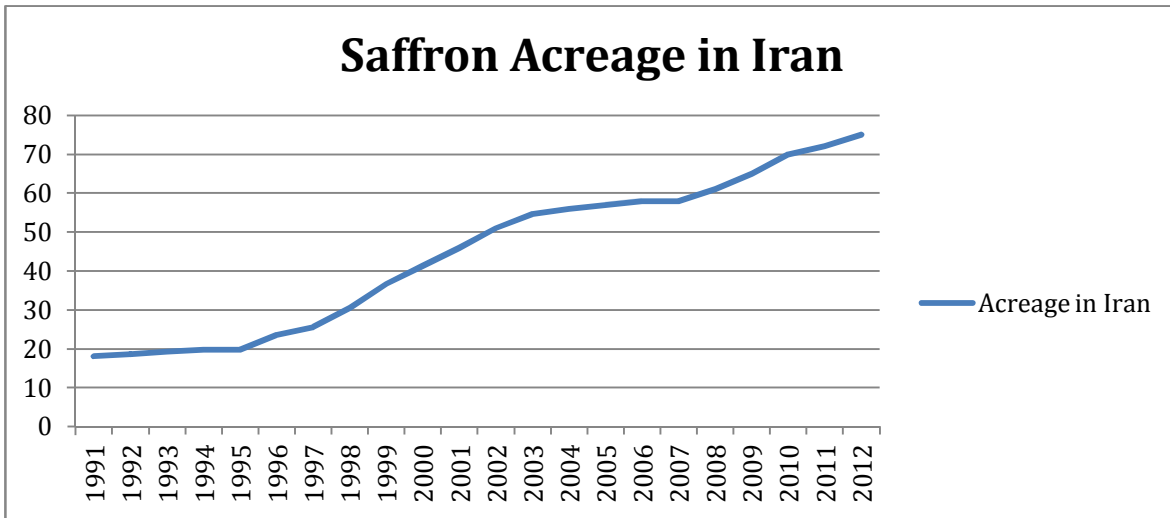


Fig 1: Saffron acreage in Iran

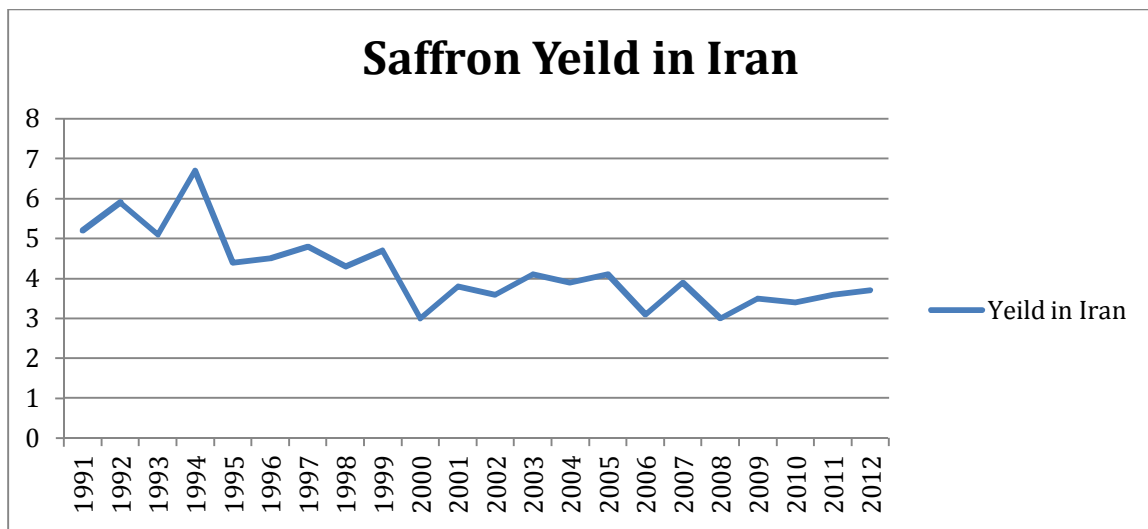


Fig 2: Saffron yield in Iran

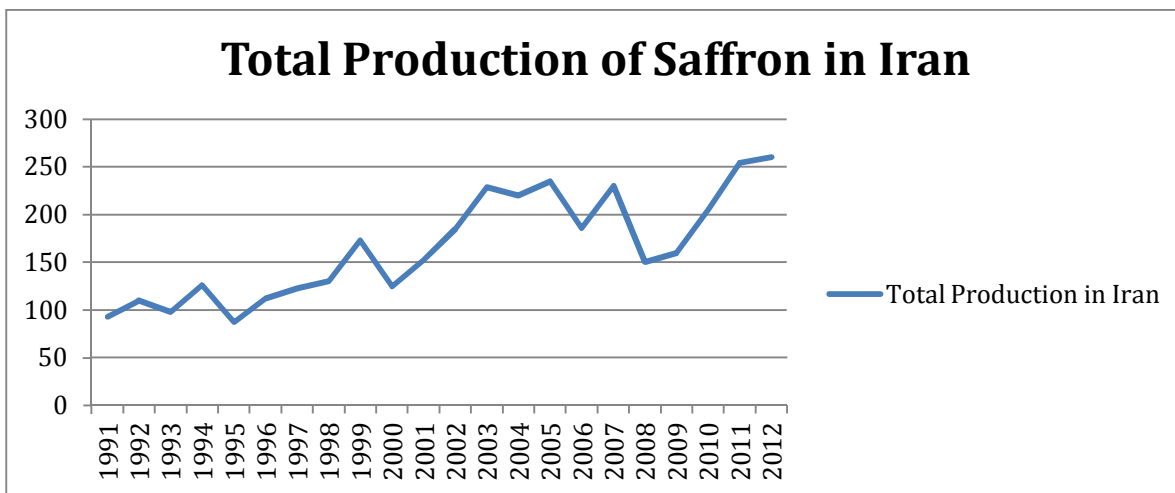


Fig 3: Total production of saffron in Iran

Saffron has the potential to play an important role in Iran agriculture development; but, especially in marketing of this valuable agricultural production, there are different problems that reduce the rate of development trend (Mortazavi and et al, 2013). The share of saffron export in Iran agricultural export is 2.6% and also the share of saffron export in non oil export of Iran is 1% (Safdari and Motiee, 2012). A saffron cultivation condition is compatible to agricultural sustainable development index in Iran.

Sustainable agriculture and saffron cultivation condition

The key principles for sustainability are to:

1. integrate biological and ecological processes such as nutrient cycling, nitrogen fixation, soil regeneration, allelopathy, competition, predation and parasitism into food production processes,
2. minimize the use of those non-renewable inputs that cause harm to the environment or to the health of farmers and consumers,
3. make productive use of the knowledge and skills of farmers, thus improving their self-reliance and substituting human capital for costly external inputs, and
4. make productive use of people's collective capacities to work together to solve common agricultural and natural resource problems, such as for pest, watershed, irrigation, forest and credit management (Pretty, 2008).

Saffron is one of the major export products and plays a major role in income and employment saffron procedures in Iran.

Saffron cultivation advantages

1. Low water requirement and suitable water requirement

There is no doubt that saffron is one of the crops adaptable to the dry climatic condition. Annual rainfall requirement for saffron is about 300 mm. Saffron maximum water requirement is in March and April of about 15 to 20liters per m² per irrigation period and also during saffron growing season other crops do not need water (Katawazy, 2013). Therefore saffron is a suitable plant for semi-arid regions like Iran where water limitation is a prevalent problem. The dormancy period of saffron coincide with the period where water is limited. Certainly the most crucial moment for irrigation is after summer to awaken the corms, but this coincidence with autumn rains so expecting a severe drought seasons, this may be considered unnecessary (Gresta and et al, 2008).

2. Employment of saffron production

Average labor requirement (employment) for Saffron production is 200 person day per hectare (Ghorbani, 2010). Also more than 80% of activities can be carried out by women. Women would be employed

in collecting flowers from the field and drying the saffron and respondents judged that women's status would benefit as a result (Katawazy, 2013). It takes 250,000 crocus flowers and 40 hours of labor to manually extract enough stigmas to yield 1 kilogram (kg) of saffron. Picking flowers generally begins from October to November in Khorasan but this differs in the region according to the climate variability and time of first irrigation. The flowering period of a field lasts for 15 to 25 days, starting gradually and reaching a peak from the 7th to 10th day. (Kafi et al., 2006)

3. Higher income

Saffron is the most expensive spice in the world (Average prices are \$1200 per and good quality saffron sells from \$2,000 to \$10,000 per kilogram or more. Over 200,000 dried stigmas (obtained from about 70,000 flowers) yield 500 g of pure saffron (not contaminated with safflower) which cost as much as \$30 per ounce in the American market (Gohari and et al, 2013). Annual worldwide sales of saffron are an estimated \$660 million. Iranian farmers give average 5000\$ USD income per year in per hectare.

4. Easy transportation and international market

Demand for saffron has been increased and also compared to other crop product saffron is not bulk.

There are 20 major channels in the marketing saffron in Iran. According to the exporters, the major destinations for Iranian saffron were European Union, Persian Gulf Countries, South East Asian Countries and other countries including India and China. The main agents active in marketing were wholesalers in Mashhad and Tehran/Processing and Packaging Companies and exporters (Kheirandish and Srinivasa 2012). These channels as follows:

Channel 1(Direct marketing): Producer- domestic consumer

Channel 2: Producer- wholesale- domestic consumer

Channel 3: Producer- wholesale- retail sale- domestic consumer

Channel 4: Producer- rural cooperatives- domestic consumer

Channel 5: Producer- rural cooperatives- foreign consumer

Channel 6: Producer- rural cooperatives- wholesale- retail sale- domestic consumes

Channel 7: Producer- Saffron producer's cooperative- domestic consumer

Channel 8: Producer- Saffron producer's cooperative- foreign consumer

Channel 9: Producer- Saffron producer's cooperative- Processing and packaging company- domestic consumer

Channel 10: Producer- Saffron producer's cooperative- foreign consumer

Channel 11: Producer- rural cooperatives- processing and packaging company wholesale- retail sale- domestic consumer

Channel 12: Producer- Saffron producers cooperative- processing and packaging company- wholesale- retail sale- domestic consumer

Channel 13: Producer- exchange market- domestic consumer

Channel 14: Producer- exchange market- foreign consumer

Channel 15: Producer- Saffron producer's cooperative- exchange market- domestic consumer

Channel 16: Producer- Saffron producer's cooperative- exchange market- foreign

consumer

Channel 17: Producer- rural cooperatives- exchange market- domestic consumer

Channel 18: Producer- rural cooperatives- exchange market- foreign consumer

Channel 19: Producer- retail sale- domestic consumer

Channel 20: Producer- wholesale- processing and packaging company- retail sale domestic consumer, (Ghorbani, 2010).

Costs and values added of by saffron actors

Farmers (cultivate and harvests flowers) Cost \$800 and value added \$900.

Farmers or local business (primary processed) Cost \$1700 and value added \$500.

Processing and packaging company Cost \$2200 and value added \$2000.

Retail sales Cost \$4200 and value added \$2300.

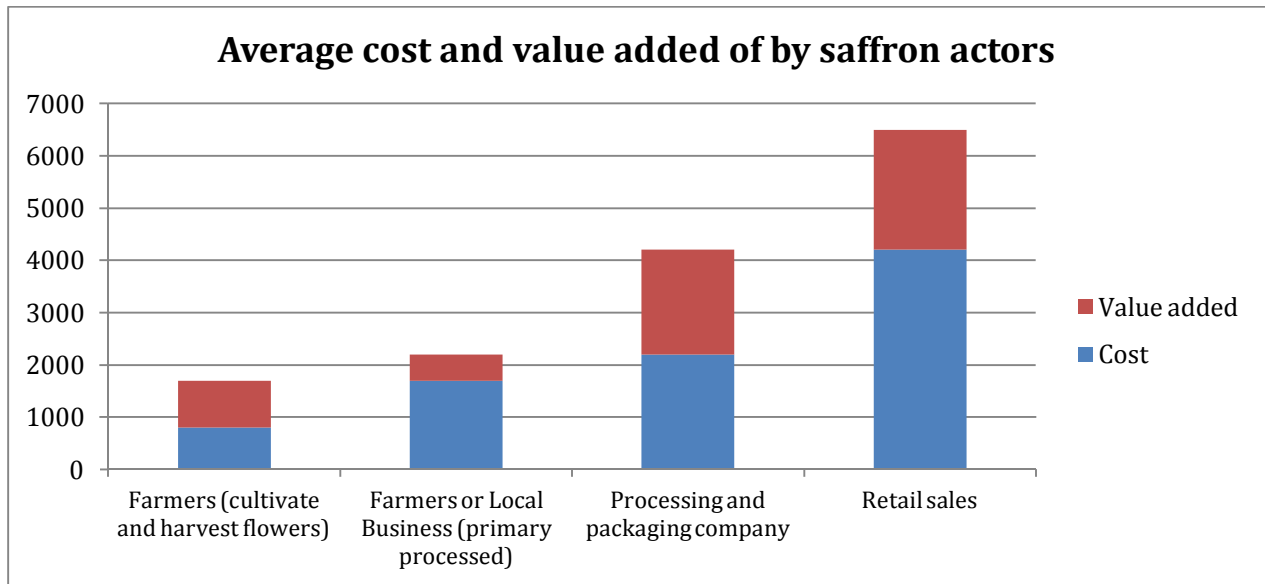


Fig 4: Average cost and value added of by saffron actors

Conclusion and Discussion

With a recent increase in world price of saffron, some farmers have shown interest in improved technologies and adoption of scientific techniques for commercial benefits. Also unsustainability in saffron cultivation support policy, would be caused threatened the livelihoods of thousands of farmers and traders associated with it. The main problem of crops production in Iran is the drought and water scarcity problem in recent years. Despite of these problems the result of this study showed that with investigate to condition requirements to saffron plantation in Iran, saffron had a good condition to develop this crop to achieve of sustainable agriculture in Iran because saffron is one of the crops adaptable to the dry climatic condition, labor requirement (employment) for Saffron

production is 200 person day per hectare and also more than 80% of activities can be carried out by women. Therefore, farmers will get good income from the cultivation of saffron, which will contribute to the empowerment of women. Demand for saffron has been increased and also compared to other crop product saffron is not bulk thus saffron could be a sustainable crop for advice to farmers in semi arid land such as in Iran. As a result, in order to capture more value added saffron from farmers, it is recommended that the processing and packaging processes of saffron have done by farmers in rural areas by rural and agricultural cooperatives. This may lead to more sustainable in saffron production in Iran.

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