SAFFRON MANUAL FOR AFGHANISTAN

Planting, Maintenance, Harvesting and Processing

DACAAR ICARDA DFID Department for International Development

Saffron: Afghanistan Red Gold

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Foreword from DACAAR

In some parts of Afghanistan, saffron has been highly successful. Well suited to the climate and environment, this exotic spice has established itself amongst farmers, private companies, traders and buyers as an excellent income generation opportunity.

For several years, particularly in the Province of Herat, DACAAR has been involved in the promotion of saffron cultivation by Afghan farmers. Through the Rural Development Programme (RDP), DACAAR helps farmers organize themselves into Saffron Growers Associations, provide the associations the essential management and technical training and offers the inputs necessary to the production and processing of saffron. DACAAR assists the associations with the marketing of saffron products by facilitating the linkage between the associations and saffron traders and buyers, both at the national and international level. In the implementation of all these activities, DACAAR works in close partnership with relevant government agencies, research institutions, private companies and other NGOs.

DACAAR – RDP prepared this Saffron Manual for Afghanistan to provide information relevant to the needs of Afghan farmers, extension workers, trainers, and policy makers. This manual contains technical information related to saffron planting, maintenance, harvesting and processing. It also includes general information on saffron production, marketing, challenges and other issues affecting Afghan saffron farmers. It is hoped that this manual contributes effectively, to the work of all those involved with the production, processing and marketing of saffron in Afghanistan.

Dr. Arif Qaraeen
DACAAR Director

Foreword from ICARDA - RALF

The publication of this Saffron Manual for Afghanistan in English, Pushtu and Dari is one of the tangible outcomes of the Research in Alternative Livelihoods Fund (RALF) Programme implemented by ICARDA with funding support from DFID. This manual was developed based on experience from a 3-year research project "Research in Production and Marketing of Saffron as an Alternative to Opium Poppy Cultivation" implemented by DACAAR. This project is one of the 11 projects under the RALF Programme implemented by ICARDA and 24 national and international implementing partners in 17 provinces of Afghanistan.

Although a great deal of progress has been achieved since the inception of the saffron project in early 2005, there are still challenges ahead related to saffron cultivation in terms of improving corm quality, saffron processing and quality control and expanding the volume of production in order to market the product as the "Afghan saffron" in the international markets.

It is hoped that this manual will help overcome the above-mentioned challenges on saffron cultivation alongside with the coordination efforts at the national level of the National Saffron Coordination and Support Committee which was established as an outcome of the RALF Programme. In particular, it is looked forward that this manual will provide guidance to saffron growers not only in the Province of Herat but also in other provinces of Afghanistan where the saffron plant is adaptable.

Dr. Najibullah Malik
RALF Program Manager
ICARDA

Introduction

There are different theories relating to the origin of saffron. Several historical testimonies dated from around 2000 years ago mention that saffron was available in Afghanistan. More recently, there are records that around 80 years ago some farmers re-started growing this crop in Herat Province.

In 1973 the Afghan Government implemented a saffron trial planting in Ordokhan Farm of Herat. However, no information can be found on the result of the production trials. In 1991, after the return of refugees from Iran to Afghanistan, some who had worked in saffron fields in Iran brought back with them saffron corms, also referred to as bulbs or onions, and on their return planted saffron in Ghorian District of Herat Province.

In 1998 DACAAR established saffron trials with four local farmers in semi-arid villages of Pashtoon Zarghon District of Herat Province. By 2007, due to good results and high returns, more than 300 farmers are growing saffron in this district. As a result of DACAAR's positive experiences with saffron, from 2002 the Ministry of Agriculture and some other NGOs began to distribute saffron corms to farmers and other saffron growers in the provinces of Herat, Mazar-i Sharif, Baghlan, Kabul, Wardak, Bamyan, Logar, and others.

This manual on saffron planting, maintenance, harvesting and processing was prepared by DACAAR as part of the activities under the Research in Alternative Livelihoods Fund (RALF) 02 – 02 Project. DACAAR received funding for this project from the UK's Department for International Development (DFID) through the International Center for Agriculture Research in Dry Areas (ICARDA). This manual aims to support the promotion of saffron as a high-value spice in Afghan agriculture. This manual was developed based on DACAAR's field experience with saffron cultivation and it is expected that this manual will serve as a guide to farmers, trainers, agriculture extension workers and policy makers.

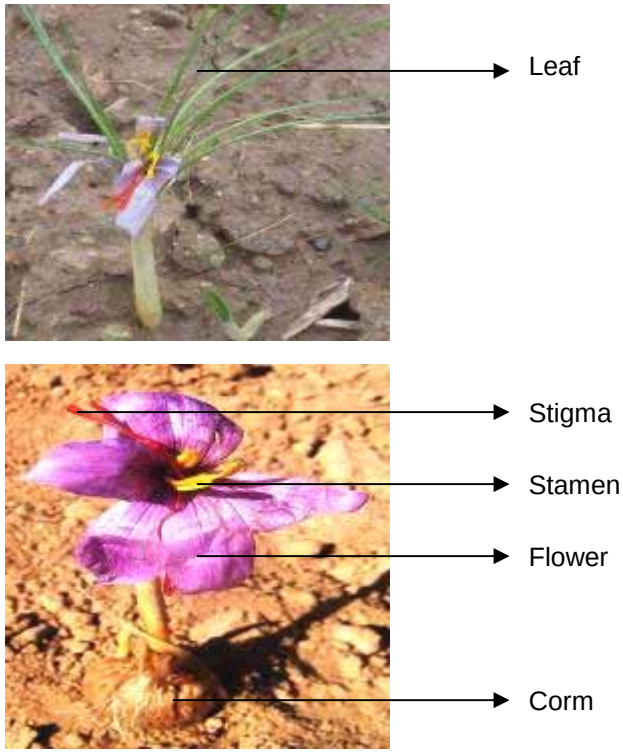
Saffron: Afghanistan Red Gold

What is Saffron?

Saffron is the most precious and most expensive spice in the world. It is a spice derived from the flower of Saffron *(Crocus sativus L.)* plant. The flower of this plant has three (3) stigmas and these are often collected and dried to make the saffron spice.

Saffron plant has a flashy bulb called corm or onion which is about 3 cm in diameter and weighs approximately 8 g (maximum). Saffron has narrow leaves with the length of 6 – 10 cm and width of 2-3 mm. Saffron flower is light purple in colour with red or white strip sometimes.

The Saffron Plant



Uses of Saffron

The three stigmas of the saffron flower are the most important economic part of the plant. The saffron stigma is rich in aroma and colour. In dried or powdered forms, stigmas are commonly used as:

- spice or colouring in food preparation
- materials in pharmaceutical, cosmetic and perfume industries
- dye material in textile production

Saffron anti-cancer effects have been studied extensively during recent years.

Saffron leaves are also used as animal feed. Five (5) jerib of saffron produces about 1.5 tons of leaf dry matter per year.

Saffron Plantation Establishment

Site Requirements

There is no doubt that saffron is one of the crops adaptable to the climatic condition of Afghanistan. For better growth and production, saffron requires the following specific condition:

Climate: Mild winters with heavy snowfall and hot summers are excellent; which means that the climate of some parts of Afghanistan, such as Herat Province, is suitable for saffron production.

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

Moisture: Annual rainfall requirement for saffron is about 300 mm. Saffron maximum water requirement is in March and April of about 15 to 20 litters per m^2 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. Saffron is believed to be a low nutrient requiring plant and so fertile soils with high nutrient contents is not ideal because this may result in excessive vegetative growth and little flower production. Optimal soil pH value required by saffron plant is 7-7.5. Soils with high moisture content and prone to water logging or flooding are not suitable for saffron production, as corm decomposition resulting from fungus infection may occur.

Land Preparation

The land should be prepared before planting saffron corms as follows:

- Deep ploughing of land (20 - 25 cm)
- Land levelling
- Removal of weeds and dead plant material, stones, etc. from the field.
- Making of suitable ridges or small plots

Soil preparation is practiced in autumn or winter, and application of 4-6 tons well decomposed animal manure per jerib is recommended. A second shallow tillage is necessary in late March or early April.

Planting Method and Plant Density

Different planting methods are used in different countries. The following planting methods are applicable in Afghanistan:

1. Ridge Planting Method

Ridge planting method has the following advantages: irrigation is easy, corm is prevented from being soaked in water – logged soils and therefore corm decomposition is prevented. Ridge cultivation provides better protection against high temperature as well as pest and diseases.

In ridge planting method, the following must be observed:

- Height of ridge should be about 30 cm.
- Distance between ridges can be 75 cm when prepared by machine/tractor or 50 cm between ridges when prepared manually.
- Planting rate should be a minimum of 1,000 kg corm per jerib to a maximum of 2,600 kg corm per jerib.
- Planting distance between corms is flexible.
- Planting depth should be 20-25 cm below the surface of the ridge.

Ridge planting method (Herat Province, Afghanistan)

2. Flat Bed Planting Method

The following must be observed in flat bed planting method:

- Plant density should be 50 plants per m^2
- Planting rate is 1,000 kg corm per jerib.(0.5 kg per m^2)
- Distance of planting in good levelled field should be 20 cm between rows and 10 cm between plants. Alternatively, 40 cm between rows and 5 cm between plants is acceptable.
- Planting depth is15 cm

Flat bed planting method (Herat Province, Afghanistan)

3. Traditional Planting Method

The traditional planting method is done by planting of saffron corm in a pit. Under this method, the following is commonly practiced:

- Distance between pits is 25 cm
- Pit radius is about 20 – 25 cm.
- Pit depth is 20 - 25 cm
- 3-15 corms are planted per pit

Traditional pit planting method (Herat Province, Afghanistan)

Corm Preparation before Planting

Corm Selection: Corm for planting should come from 2 to 4 year old saffron corm bank or saffron multiplication field. Corm should be healthy with no injuries. It should be big size with approximate weight of 8 g or more and a diameter of 3 cm. However, medium size corm with the weight 6 g and diameter of 2.5 cm could also be used in the absence of big size corm.

Corm sizes

Corm storage: Corm should be planted immediately after they are removed from the field. Corm storage before planting is not recommended because it may reduce the flowering potential of the plant. In cases however, that storing is essential, then corm should be stored in dry and cool room (3 to 5ºC) with good ventilation for only a few days but not more than a month.

Corm packaging and transport: Saffron corm packaging and transportation to new fields should be done very carefully. Plastic or carton boxes are suitable. A maximum load of 15 – 17 kg per box is optimal.

Corm packaging for transport to the field

***Corm treatment*:** It is <u>not</u> recommended to apply fungicide on the corm before planting, because the mercury contents may hamper the quality of the spice. However, if fungicides such as Vitavax or Ceresan are applied, the instructions of the manufacturer should be strictly observed (300 - 500 g for 100 kg corm have been recommended). Wearing of breathing mask and rubber gloves during application is a must. Put the untreated corms on a plastic sheet and spread the powder fungicide evenly on top of the corms, then carefully roll the corms to further spread the fungicide powder on corm surface.

Planting of Saffron Corm

Regardless of what planting method is used, in Afghanistan in general planting of saffron corm is done from late May through early October. However, recent research results from Khurasan Province in Iran with similar climate conditions as Herat Province indicate that planting of saffron corm from April through June leads the best production.

Planting of saffron corm should be done following the instruction described for the different planting methods.

Care and Maintenance of Saffron Plantation

Immediate Care after Corm Planting: Care must be exercised after planting the corm. Do not walk inside the field, unless it is necessary, and do not allow children to play inside the field, to avoid stepping on the planted corm. Corm is sensitive that once you stepped on it, its survival may be affected. Similarly, do not allow animals to walk inside the newly planted field.

Fertilizer Application: Saffron requires limited amount of nutrients compare to other agricultural plants. It is estimated that for 1 kg of saffron dry matter only about 12 g Nitrogen, 3 g Potassium and 22 g Phosphorous are removed from the soil.

Application of too much fertilizer to the plant is <u>not</u> recommended because this will result in excessive vegetative growth that will negatively affect the corm quality and flower development. The only fertilizer application required is therefore the application of 4 to 6 tons per jerib of well decomposed animal manure before ploughing and planting.

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Irrigation: Saffron is a suitable plant for semi-arid regions like Afghanistan where water limitation is a prevalent problem. Saffron corm normally undergo dormancy period for 5 months starting from early May up to late October where irrigation is not required. The dormancy period of saffron coincide with the period where water is limited. The irrigation requirements of saffron, if there is any, occurs at times when other crops have little or no need for irrigation, so saffron does not compete with other crops for irrigation water.

The growth of saffron starts immediately after first irrigation at the end of its dormancy period. Therefore, irrigation at the end of September is essential to induce early flowering.

The succeeding growth period of saffron usually falls into the winter and spring period with sufficient rainfall. However, if rainfall is not sufficient after the flower harvesting and at the emergence of the leaves, a second irrigation should be applied.

Irrigation during summer has some positive effects on the saffron yield but it is not recommended because of the high risk of fungal infection to the corm due to water logging.

Saffron Corm Thinning: New saffron corms grow above the old corm each season and they normally protrude on soil surface by about 1-3 cm each year. The corm protruding on the surface is normally damaged by frost and thereby affecting the growth of plant. Therefore, periodically after 4 years up to 7 years, some corms need to be removed from the mother plant and these corms can be used as planting material in establishing another saffron field. Corms should be removed from the mother plant carefully by digging using shovel.

Weed control: Weed control is an important practice in saffron cultivation. Farmers have to weed regularly, as follows:

- after each irrigation
- after flowers have been harvested
- additional weeding may be needed for control of spring and summer weeds

Caution should be made during weeding, especially in ridge planting method, not to step on the ridge. The person doing the weeding should walk between ridges. Take all the weeds out of the field in a basket and feed them to animals or heap them for composting for use in the establishment of new saffron field.

Breaking of Soil Crust: In the second year after first irrigation, breaking of the soil crust is important practice to facilitate the emergence of flowers. Breaking of the crust in the soil surface up to depths of 5-10 cm is recommended.

Pests and Diseases Control: The taste and smell of saffron corm is attractive to many animals. The corm is palatable food for insects, worms, domestic and wild animals. It is therefore necessary that the farmers should regularly check the field for any damage.

Some of the known pests and diseases related problems on saffron and their recommended solutions are as follows:

- Rodents (rats and mice) - Rodents such as rats and mice cause damage in saffron fields by digging holes and tunnels in the ground and eating the corms. To control their damage, it is recommended to use trap and bait. However, caution should be made to secure that the poisonous bait is not reachable by domestic animals.

- Rabbits - Rabbits normally eat the succulent leaves and flowers of saffron. To control rabbit damage, the use of wire net fences has proven very efficient and therefore recommended.

- Snails - The same with rabbits, snails also attack the green leaves of saffron. To prevent this, let fowls especially ducks and geese go through the saffron fields to eat the snails.

- Birds - New corms normally grow on top of old corms and these new corms are normally exposed. These corms are eaten by birds. To prevent the damage, corm thinning is recommended to remove exposed corms for planting to another field. If not, cover the exposed corms with soil. Also avoid storing corms in an open field where birds have easy access to it. If it cannot be avoided to store corms in the field before planting, make sure that corms are covered to hinder birds from from access to it.

- Insects – An un – identified insect, in the form of white worm, that lives on the soil also creates damage to saffron plant by eating the corm. The symptoms of damage by this type of worms include discoloration or yellowing of leaves, wilting, and finally drying of the plant. If this problem occurs, it is recommended to immediately up – root the infected plant, separate the remaining good corm for planting and burn the infected corm.

- Fungus – Aside from fungus infection on the corm planting materials, occasionally fungus infection on living saffron plant also appear. However, no clear identification and control has been studied yet.

- Domestic animals – In summer, where all other plants turn brown, saffron remains green thereby making it attractive to domestic animals like goats and cows. Saffron field must be protected from these animals by constructing fences. It is highly recommended to use living fence using legume trees or shrubs to be planted around the field. The leguminous living fence will provide several benefits, aside from protecting saffron from domestic animals. The fence could be trimmed regularly and the leaves could be used as feed to animals or material for composting and the stems could be used as fuel wood.

- Diseases - Diseases on saffron have rarely been observed in Afghanistan, and virus infections such as the tobacco rattle virus (TRV, a tobravirus) have only been observed in ornamental *Saffron* species in Europe.

Bird damage to saffron corm

Tobacco rattle virus (TRV)

Unidentified fungus infection on saffron corms

Saffron Flowers Harvesting

The flowering stage of saffron starts from October and continues for some 3 weeks. Each flower lives only for some 48 hours. This is the reason why saffron has such a high value. The vast amount of labour required for harvesting and on-farm processing in a relatively short period.

Saffron flowers should be picked early morning as soon as they open. The timing of the harvest and speedy processing is important, as the wilting of the flowers makes the post-harvest process difficult to impossible, and the quality suffers considerably. The optimal harvest time is therefore early in the morning before there is full sun.

The flowers should be cut from the plant by the fingernails near to the ground. It should be put in a clean basket to avoid contamination of stigma. A good flower collector can collect as much as 3,000 flowers per hour.

After collection, the flowers should be transported to a farm house or other location where it should be kept in a clean and shady place until further processing. If necessary, the saffron flowers should be stored at temperatures near 0°C, and the layer of fresh flowers should not exceed 10 cm. Under these conditions, saffron flowers can be kept for up to 7 days.

Post - Harvest Processing

Separation of Stigma from Saffron Flowers

Immediate post-harvest processing will give the best saffron spice quality. During the post-harvest processing, the stigmas are separated from the flowers. The stigmas are bright orange-red and are clearly visible among the lilac petals. It takes some 450,000 stigmas to make up a kilogram of saffron spice. Workers must process 150,000 – 170,000 flowers to

produce one kilo. The deep red stigmas are attached to the flowers by pale filaments called styles. These, as well as the yellow stamens, are worthless as spice.

Many merchants prefer to buy only pure saffron, requiring that the stigmas be separated from the styles, which has to be done by hand as long as the material is fresh.

The following must be taken into consideration when separating saffron stigma from the flower:

- Separate stigmas from flowers in a clean environment.
- Ensure that the place where stigmas are separated from flowers is free from dust.
- Ensure that the people who do this work keep their hands clean at all times, washing thoroughly with antibacterial soap.
- Separate the stigmas from the styles depending on the requirement of potential buyers. Some buyers (wholesalers and retailers) prefer the styles to be included and arrange in bunches. The reason for this is that buyers want to make sure that saffron is pure and free from adulteration. Because saffron is so expensive, some suppliers are tempted to adulterate it with cheaper material and dye it all red to pass it off as pure. If buyers can see the styles, they are confident that the saffron is pure. They can then separate the styles from the stigmas themselves and sell the saffron under their own labels.

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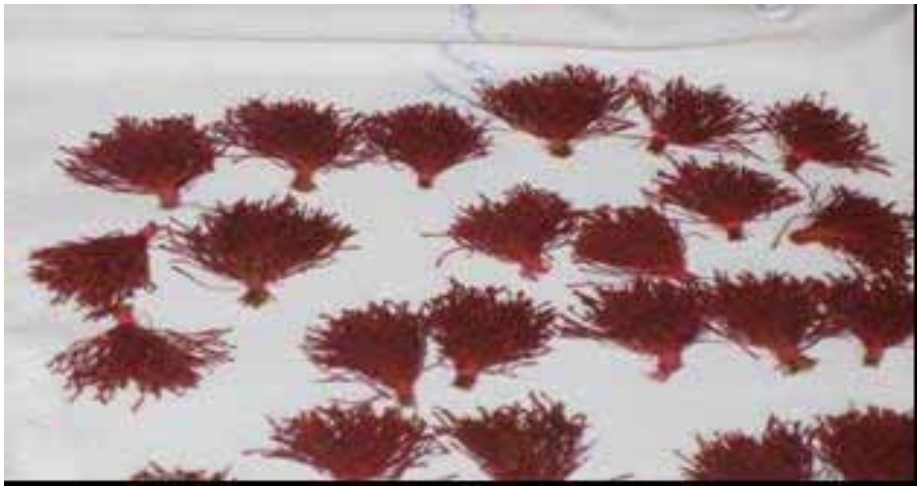
Saffron flower harvesting (Herat Province, Afghanistan)

Separation of stigma from flowers (Herat Province, Afghanistan)



Saffron stigma arranged in bundle and ready for drying.

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Drying of Saffron

The stigma must be dried immediately to keep its quality. Drying must be done in a proper way to achieve the right moisture content level. If it is too moist it may get infected with fungus, especially those causing toxic aflatoxins. If saffron is too dry it may break easily and turn into powder and weight will be reduced below the trade requirements and farmers will lose money.

In Afghanistan most saffron is air dried. It takes up to a week to dry saffron under this method. Using this method, the following must be taken into considerations:

- Air dry saffron in an area free from dust and direct sunlight and in an area where birds have no access
- Put individual saffron stigma in a drying container like pale, basin, tray or big plate.
- Cover the container with thin cloth or screen to prevent contamination. When covering the container, make sure that there is good aeration.

Simple electric drier was recently introduced in Herat Province with good results. Drying with electric dryers takes minutes rather than days and makes it easier to control the moisture level (12 % to 14 %) of the saffron.

Improved kilns dryers are also available where drying temperature and humidity could be controlled better, making the quality of dried saffron better but these are currently considered too expensive.

Saffron electric dryer introduced recently in Herat Province, Afghanistan

Packaging and Storing of Saffron

Ideally, saffron should be packed in air-tight and light protected containers like tin cans and dark glasses. However, some buyers prefer saffron to be packed in a clear glass so that they can make the quality assessment easily without necessarily removing the saffron from the container. If saffron is packed in a clear glass, it must be stored in a dark place until it is sold to prevent deterioration and loss of quality.

Most plastic bags and solid plastic containers are not recommended in packing saffron. Although it can also be sealed, the aroma of saffron can still escape and the quality of spice becomes lower.

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Acknowledgement

The preparation of this Saffron Manual for Afghanistan was made possible through the concerted efforts of staff from DACAAR's Rural Development Program (RDP) and Public Information Unit (PIU). In particular, the development and finalisation of this manual was led by Mohammad Hashim Aslami (NRM Specialist), Erwin O. Nacuray (NRM Advisor), and Dr. Arif Qaraeen (Director).

This manual was prepared by DACAAR as part of the activities under the Research in Alternative Livelihoods Fund (RALF) 02 – 02 Project "Research in Production and Marketing of Saffron as an Alternative to Opium Poppy Cultivation. A project funded by UK's Department for International Development (DFID) through the International Center for Agriculture Research in Dry Areas (ICARDA).

ANNEXES

Saffron: Afghanistan Red Gold

Annex 1. Why saffron for Afghanistan?

Saffron is a suitable crop for Afghanistan because:

1	Low water requirement	1 or 2 irrigations usually suffice in Afghanistan
2	Labour intensive	250 person-days per year
3	Simple machinery	All activities are possible by hand
4	Easy transportation	Compared to other crop products, saffron is not bulky
5	Income is higher than for other crops	At least 5,000 USD per ha annually
6	International market	The demand increases year by year
7	Short growing season	One month labour input required per year
8	Suitable water requirement time	During saffron growing season other crops do not need water
9	7 years production	Land preparation and cultivation labour requirements only in the first year
10	Low risk	Drought resistance, no specific saffron diseases
11	Gender	80% of activities can be carried out by women
12	Good storage abilities	Up to 2 years after drying
13	High productivity	Afghanistan's soil and climate are very suitable

Annex 2. Picture of saffron in Afghanistan (2007)

- Area under cultivation: 161 ha
- Total number of saffron growers about: 1,100 farmers
- Total estimated production: 400-500 kg
- Average yield: 7 kg/ha
- Maximum yield: 24kg/ha
- No of saffron associations: 5 (4 associations in Pashtoon Zarghon and 1 in Ghorian district)
- No of women saffron grower associations: 1
- Afghan saffron market: Afghanistan, Iran, India, Dubai, Pakistan, USA, and Europe[1]
- Saffron price: 1,200 to 1,400 USD/kg in local (Herat) markets (December 2007)
- Saffron price: 1,400 to 8,000 USD/kg in European and American markets (2006).
- Number of private companies in saffron production and marketing: 3 (may be more)
- Facilities (provided by DACAAR in Herat): Saffron quality test laboratory at Herat Department of Agriculture equipped with 16 electric dryers, harvesting and separation tools (basket, gloves, etc.) are distributed to saffron grower associations

[1] Afghan saffron is also exported to USA and Europe through transit locations such as Iran or Dubai, and usually branded as originating from these countries

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Annex 3. Afghan saffron quality

Afghanistan saffron quality tests show that Afghan saffron can be one of the best in terms of quality. This is attributed to the climatic condition of Afghanistan as suitable to the growth and production of saffron.

Saffron quality test results, saffron from local corm compared with saffron from Dutch corm (Pashtoon Zarghon District, Herat Province, Afghanistan, 2006)

Character	ISO 3632 Standard value	Local saffron dried in open air		Local saffron dried on local dryer		Holland saffron dried in electric kiln	
		quality	Grade	quality	Grade	quality	Grade
Moisture	12%	9.72 %	II	7.46 %	I	9.88 %	I
Flavour (picrocrocine)	70	74.88		100.06		85	
Aroma (safranal)	20 - 30	42.31		35.01		36.62	
Colour strength (crocin)	190	195.39		278.36		210.83	

Branch saffron sample (Herat Province, Afghanistan)

	ISO 3632 Category I	With styles	Stigmas only
Picrocrocine (flavour - bitterness)	70	60.05	88.67
Safranal (aroma)	20-50	25.42	35.03
Crocin (colour)	190	141.12	244.195

Saffron types are graded by quality according to laboratory measurements of such characteristics as *crocin* (colour), *picrocrocin* (taste), and *safranal* (fragrance) content. Other analyses include floral waste content (i.e. the saffron spice sample's non-stigma floral content) and measurements of other extraneous matter such as inorganic material ("ash").

Annex 4. Saffron international standard and quality

Saffron is a very expensive spice, it is therefore important that the quality of the product matches to the national and international standards. The quantity of colouring strength, flavour, aroma and smell of saffron is now measurable using spectrophotometer. The testing standards for saffron were already developed by the International Organization for Standardization (ISO).

Similarly, there are standards that must be complied with when it comes to the packing of saffron. According to regulations for foods and drugs, including saffron, many importing countries require that saffron containers should be labelled and the labels should specify:

- The package contents (saffron and its quality classification)
- Any additives (presumably none in the case of saffron)
- Net weight of contents
- Name, address, telephone, e-mail of importer (i.e. who to contact if there is a problem with the saffron)
- A lot number to identify the source of the saffron, as close to origin as possible (to trace the cause of any problem).
- An expiration date (which will vary depending on the type of container).
- In the United States some importers like to receive saffron in bulk and package it themselves in their own containers with their own labels. Others prefer to receive the saffron already pack so that they do not have to be registered as a packing agency and go through the expense that registration entails. The easiest way to accommodate both is to have a logo or emblem that designates the saffron as coming from Afghanistan and Herat. This could then be incorporated in the importer's label or put on a separate label on the container. Which approach is taken will depend on negotiation with the importers.

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Annex 5. Afghanistan saffron marketing strategies

National Market Promotion

- Raise awareness about saffron usage
- Introduce new saffron products to families, restaurants, etc
- Media coverage
- Surveys and research on consumer preferences for new saffron
- Improve distribution system in local markets

How can we reach to world market?

- Ensure high productivity through good corm and other best practices.
- High quality is a necessity to obtain good market prices. Care should thus be taken in cultivation, processing, and packaging of saffron to ensure optimal quality
- Obtain organic and fair trade certification (optional)

Annex 6. Summary of key problems and constraints for saffron farmers in Afghanistan

1. Marketing of Afghan product

- Afghan saffron is unrecognized and unbranded in the market, most goes through Iranian channels. However, there is strong interest amongst international buyers (particularly Holland, USA, Australia and Italy) to procure Afghan saffron, provided a guarantee of quality can be assured.
- Lack of quality assurances for international buyers (no ISO compliance).
- Lack of knowledge of market dynamics, pricing structures and marketing approaches (strong need for detailed study)
- Lack of skills in marketing
- Lack of competition amongst Afghan exporters.

2. Lack of production capacity

- Producers need to be organised in local, provincial and national associations to improve their access to technical support
- Lack of regulation on corm imports. Farmers have no training to identify good quality leaving them vulnerable to purchasing bad quality corms. Without this basic training, growing saffron becomes a high risk investment as farmers may lose their initial investment.
- High prices and low availability of corm. The increasing interest in corm has led to an artificial increase in corm prices. Current investments needed are around USD$ 5,000 per hectare which is prohibitively expensive for many farmers. 'Corm banks' and subsidized corm schemes should be used to improve this situation.
- Lack of government support. Some organizations are importing corm from Iran rather than purchasing from Afghan farmers at higher prices
- Because of the strong demand for corm, some farmers are now making short term gains by producing corm rather than producing saffron. This is impacting the horizontal expansion of the industry which, if left unregulated, may lead to reductions in overall production if farmers remain untrained on corm quality.
- Farmers that are 'given' corm by some organizations may not be trained sufficiently in its cultivation, particularly in bed preparation (raised beds), row spacing, timely irrigation or adequate fertilization.

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- More training is needed for farmers in the area of post-harvest management. This is a key issue, as most processing and drying is conducted at a village level.

3. Lack of industry standards

- Farmers are not aware of the international standards for quality and hygiene required for selling produce directly to international customers.
- A grading system based on quality needs to be established.
- It is necessary that unless standards are addressed quickly, then the private sector is likely to move intro Afghan production and gain market share.

4. Lack of local storage or packaging capacity

- Lack of packaging equipment for organizing consignments to international markets. It has been proven that prices fluctuate according to the season – for instance, prices are highest just prior to harvest (up to USD$ 8,000 per kilogram). Without adequate packaging to store saffron or package it in small attractive packages, local exporters cannot add maximum value to the final product or take advantage of price speculation.
- Key problems cited are the expense of industrial packaging machines, capable of producing the necessary packages needed for the western markets. Partnerships may need to be developed with donors and the private sector to establish a packaging factory. Current production levels are likely to be too small for localized investment.

5. Coordination between all industry stakeholders

- More coordination is needed between all value chain actors in saffron industry. Current market outlooks show that foreign companies are beginning private sector operations within Herat, and that China is now moving into saffron production. It is clear that the Afghan industry will unlikely be able to compete in this environment unless it organizes itself in a relatively short timeframe.

  Suggestions for doing this firstly, we should establish a provincial and national level Saffron Promotional Centre and organize the industry into more associations. Secondly to coordinate regular meetings between interested stakeholder groups and finally, to establish provincial and National level coordination committees

Annex 7. Saffron development priorities in Afghanistan

- Increase production at least up to 5,000kg per year.
- Improve quality
- Raise awareness of saffron usage options among Afghan families.
- Improve farmers' access to local markets
- Research on key aspects
- Capacity building on saffron production, processing and marketing, for universities, MAIL, private sector
- Establish national quality standards
- Obtain ISO and organic certifications
- Improve access to international markets
- Saffron National coordination committee support.
- Creation of coordination between all value chain actors in the saffron industry.

Annex 8. Cost of Input and Income from Saffron (2007).

Inputs/Expenses *(per 5 jerib/1 hectare) for 5 years*

Items	Estimated Amount (Afs)
Land preparation	12500
Animal Manure	36000
Corm (planting materials)	300000
Planting of corm	16633
Corm treatment	10000
Weeding	90500
Breaking soil crust	29000
Flower harvesting	10500
Irrigation	18000
Processing (spice separation, drying…)	90250
Total	**613383**

Income *(per 5 jerib/1 hectare) for 5 years*

Items	Estimated Amount (Afs)
Saffron spice	1200000
Corms	*82500
Dried leaves (livestock feeds)	10000
Total	**1292500**

* *At the end of 5th year one hectar saffron will produce about 22000 kg corms, but according to farmer and our experience about 50% of this amount is useable for planting or selling.*

Net Income for 5 years (total income – total input): 1292500 Afs – 613383 Afs = 679117 Afs

Net Income per year: 135823 Afs

Annex 9. Saffron Production and Prices in Afghanistan (2004 – 2007)

Year	Production Area (Hectares)	Production Rate (Kg)	Price ($/kg)
2004	16	60	200
2005	40	150	350
2006	83	240	450
2007	161	400	1,200

Average increase for the last 4 years (2004 – 2007):

- Production Area: 117.1 %
- Production Rate: 92.2 %
- Price : 90.3 %

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For further information about saffron planting, maintenance, harvesting and processing, please contact:

DACAAR Herat Provincial Office

Address : Near Check Post # 1, Herat City
Telephone Number: 222966

Or

DACAAR Rural Development Program

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