



HUMAN TERRAIN SYSTEM—RESEARCH REACHBACK CENTER



CULTURAL KNOWLEDGE REPORT

19 MAY 2009

TRACKING NUMBER: RRC-AF2-09-0007

Requestor:	AF2	Author:	Christopher Lunsford, Joshua Zenger
		Reviewed by:	RRC Afghan Team
		Country/topic tag:	AF
Date of Request:	19 APR 2009	Suspense:	19 MAY 2009

Saffron

Request for Research Summary

1. Overview of saffron, including climate/soil requirements, crop cycles, harvesting, processing, shipping, and marketing issues.
2. Recommendations on the prospects for encouraging saffron production in Afghanistan, including alternative courses of action.

Purpose/Justification

Saffron often comes up as a potential cash crop to encourage Afghan farmers to grow. For example, an ANA officer recommended to us last month that the PRT provide farmers with saffron seeds because they could provide good income and because they would be planted in the fall after summer wheat is harvested, when the fields are unused.

An RRC report on saffron could help in understanding the feasibility and suitability of promoting saffron.

RRC report follows:

Saffron: “Red Gold”

Saffron, referred to by some as “red gold,” has been in demand for centuries. The Latin name for the plant which bears the delicate spice is *Crocus sativus L.* Saffron growing has been promoted in Afghanistan in recent years in response to a call from the Afghan government to investigate economically viable licit alternatives to poppy. Due to the significant labor costs inherent to saffron production, saffron is the world’s most expensive spice. Not only are saffron profits competitive with opium, in relation to other licit crops, but saffron needs little water during growth, requires minimal refinement, and has a low volume and weight, making it easily transportable. Additionally, its production provides large-scale employment, often carried out by women, and does not compete seasonally with other crops for water or labor. Afghanistan’s climate, soil, and labor conditions make it a suitable place for the production of saffron, and may even give it a competitive advantage over other saffron producers.

While many may see saffron as the perfect solution to an economy based on the trade of an illicit commodity, there are a number of limiting factors in the development of a saffron industry in Afghanistan. Notably, the access to quality corms, or bulbs, from which to start production is insufficient, and the corms are expensive. Additionally, *crocus* fields take time to mature, occupying a field for several years, during which time the use of the field for other crops is greatly inhibited. Finally, making a premium return on saffron requires a comprehensive strategy from growing to marketing. A campaign that simply passes out corms to farmers is not enough. Thorough follow-on training and additional support in all aspects of cultivation, processing, and marketing is essential if Afghanistan’s budding saffron industry is to be competitive and profitable.

The report below first gives a brief history of saffron and its uses, followed by a detailed description of the necessary conditions and best practices for growing and cultivating saffron. The report then turns toward the economics of saffron, including an account of the Afghan saffron industry at present and marketing strategies that lay out what more could be done to expand the saffron industry in Afghanistan.

I. History of Saffron & Its Uses

Saffron has a long and widespread history of usage. Evidence of *Crocus sativus L.* cultivation and saffron production has been found in writings and artwork dating back over 3,000 years.¹



“Saffron Gatherers” a Minoan fresco from a Bronze Age settlement on Santorini Island, Greece.⁴

Historically, saffron was produced throughout the Mediterranean region, continuing through a geographic band that includes Iran, Afghanistan, Pakistan, and Kashmir. Historical writings and artwork depicting saffron production and usage come to us from classical Minoan, Greek, Roman, Arabic, and South Asian cultures.² While there is dispute over where saffron originated, it is likely that it was in modern day Iran.³

More certain than its origins are saffron’s high value and extensive trade throughout its history. The requirement to produce large volumes of flowers in order to obtain small quantities of saffron has ensured its value from antiquity to the present day. Saffron has long been valued for its medicinal, aromatic (perfumes), artistic (dyes), and culinary (spice) uses.⁵ While saffron is the most valuable product of *Crocus sativus L.*, there are secondary products of value as well. Corms, depending on their quality can be sold or used as animal fodder. The leaves of the *crocus* can also

be used as cut forage for animals.⁶ In Iran 75% of *crocus* farmers reported using the leaves for this purpose, though it is important to wait until after the formation of the corm is complete, usually in May.⁷

II. *Crocus Sativus L.* and Necessary Farming Conditions

As a perennial, the *crocus* life cycle and saffron production cycle are set within a 4 to 8 year field cycle of corm and field rotation. During the cycle a *crocus* field will continue producing until it is deemed to be decreasing in yield rates (usually in the 6 to 8 year range). At that time mature corms are lifted to a new field, and either a new crop is introduced or the field is left fallow.

Anatomy

The anatomy of the *crocus*, combined with the short flowering window in which its stigmas may be harvested, result in 80% of the work being done by hand. This necessity for intensive manual labor is why saffron demands such a high market price.

The spice saffron is the product of the three stigmas, or reproductive organs, of the *crocus*. These stigmas are a long two-part organ of the flower; the lower portion is called the style and the upper portion the stigma. The stigma and style must be gently removed from the flower and the upper red stigma separated from the lower yellow styles. Millennia of flower and corm (*crocus* bulbs) selection based on the desirable characteristics of long stigmas and triploid vigor (plant vigor is partially related to having chromosomes grouped in threes) have resulted in flowers with excellent stigmas for saffron production but which are sterile. Due to their sterility, the *crocus* must reproduce through corm multiplication. As the *crocus* grows, the mother corm multiplies into daughter corms, which are genetically identical corms that bud off of the mother. These daughter corms are then periodically lifted from the field and replanted in new locations.

Temperature

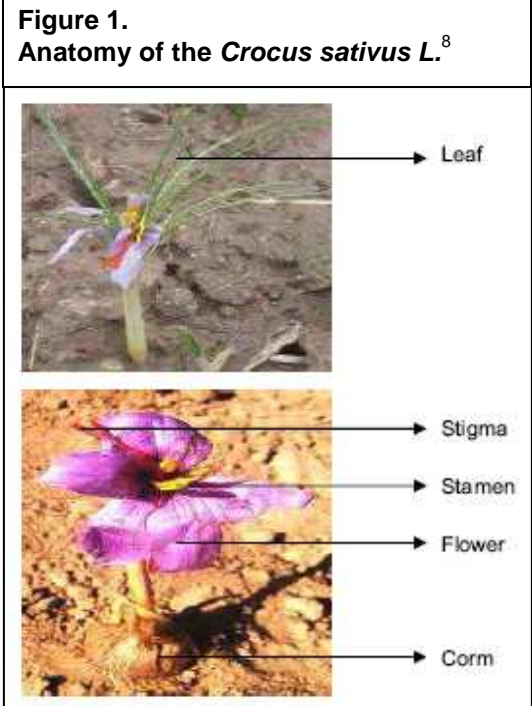
The *Crocus sativus L.* plant requires a temperate climate with adequate rainfall and soil high in organic matter. Shoot growth of the *crocus* flourishes in temperatures between 23° and 25°C.⁹ Though the *crocus* is capable of tolerating occasional snow, it requires temperatures around 17°C for optimum flower emergence.¹⁰ The plant is hardy enough to survive temperature extremes as wide as -10°C to maximum temperatures in the 45°C range.¹¹

Moisture

The *crocus* has a relatively low moisture requirement and the majority of its water needs do not compete seasonally with other crops of Afghanistan.¹² *Crocus* plants must receive a minimum of 300 mm rainfall in the fall and spring. Countries practicing irrigation have successfully produced saffron with rainfalls as low as 400 mm in Spain and 500 mm in Greece. Alternatively, the Kashmir region which has adequate rainfall (1,500 mm) produces saffron with little or no irrigation.¹³ If irrigation is to be practiced, it is most important in the fall prior to harvest, although the plant's actual peak in water needs is in March and April. During the peak water requirement period, an irrigated field needs 15 to 20 liters per square meter.¹⁴

Soil

Soil conditions satisfactory to the *crocus* are fairly wide. Optimum soils include those rich in calcium, with sandy loam and high organic content.¹⁵ Proper drainage is important to field quality and, when irrigated, can assist in the prevention of soil salinization. Soil enhancement through fertilizers will increase saffron



yield rates; however, studies show that ammonia fertilizers (usually commercial) actually lower yield rates for saffron, while nitrate fertilizers (organic) increase them.¹⁶

Experts with the Ministry of Agriculture in Kabul have stated “saffron is compatible with the climate and soil of southern, eastern, and western parts of the country and its cultivation did not require highly advanced irrigation.”¹⁷

III. Cultivation of *Crocus Sativus L.* for Saffron Production

As a perennial, the lifecycle of a field may last four to eight years, with peak production occurring in years four and five.¹⁸ The cultivation of *Crocus sativus L.* begins with field preparation in the autumn or winter and continues through tilling, fertilizing, planting, irrigating, harvesting, refining, and corm lifting. These eight steps all demand high levels of manual labor. (Refer to Table 11 “Saffron Production Cycle” in the Appendix for a description of necessary production activities by month.)

Field Preparation

Field preparation is important to the success of a *crocus* field as it is one of the only heavy tillings that a field will receive in its production cycle. The field preparation consists of deep plowing in fall or winter and is an opportune time to incorporate 20 to 100 tons of fertilizer per hectare (4-6 tons per jerib) into the field.¹⁹ The fertilizer application should consist of a high potassium or nitrate base. Manure is among the most successful fertilizers for *crocus*. Because *Crocus sativus L.* is a low nutrient requiring plant, only one application is necessary per year. Too much fertilizer causes an excess in foliage production and a decrease in flower yield.²⁰ *Crocus* fields may be placed among other row crops such as olives, grapes, and black cumin, so long as care is taken not to damage the corm beds with foot and livestock traffic.²¹ Additional shallow field tilling may occur in April, with a final tilling in late April to level the corm bed.²²

Planting

Planting of *crocus* corms is based on their size and is usually done from the end of June through late summer. Corm size has been shown to significantly influence field productivity through the increased rate of corm division found in large corms.²³ Generally, corms should be at least 3 cm in width and weigh 8 grams or more; however, 2.5 cm corms weighing only 6-7 grams may be used when larger specimens are not available.²⁴ Depending on water, planting style, and labor availability, corm numbers planted per hectare range between roughly 150,000 to 700,000 corms with an average weight of 20-22 grams.²⁵ Though recommendations on corm planting density vary greatly, a rough guide appears to be 50 corms per square meter.

Corms are usually planted in one of three layouts: the flat bed method, ridge method, and traditional method. The actual placement of the corms may take place in either a dry or moist bed but should be done immediately after corms have been lifted from a previous bed, as corm storage is not recommended.²⁶ Fungicides should not be applied at planting.²⁷



Flat Bed Planting (Herat Province, Afghanistan)²⁸

In flat bed planting, the corms should be placed at a density of 50 plants per square meter and should work out approximately to 1,000 kg of corms per jerib or .5 kg per square meter. The rows should be placed at 20 cm with a 10 cm interval between plants. If wider rows are desired, a 40 cm spacing with 5 cm between plants is appropriate. The corms should be placed at a depth of 15 cm.²⁹



Ridge Planting (Herat Province)³⁰

In preparation for ridge planting, the ridges must be formed at a height of 30 cm. The ridges should be placed 35 cm to 75 cm apart with a planting rate of 1,000 kg to 2,600 kg of corms per jerib. The distance between corms in a ridge is flexible and may reflect that of flat bed planting (5 cm to 10 cm) or traditional planting (clusters of 3 to 15).³¹ The corms should be planted at a depth of 20-25 cm.³²



Traditional Pit Planting (Herat Province)³³

The traditional method in planting *crocus* corms as reported by International Center for Agricultural Research in the Dry Areas (ICARDA) and the Danish Committee for Aid to Afghanistan Refugees (DACAAR) in their *Saffron Manual for Afghanistan* is to place pits containing 3 – 15 corms every 25 cm. These pits are 40 – 50 cm in diameter and 20 – 25 cm in depth. Conversely, in *Saffron (Crocus sativus) Production and Processing* the traditional method reported just across the border in Iran is to place up to 15 corms in small hills with 25 cm spacing separating the hills.³⁴

Irrigation

Though irrigation may not be necessary, in regions where it must be practiced the most important water application takes place in mid-October to early November.³⁵ This watering initiates plant growth and can provide an increase to flower yields when properly timed (about 10 to 15 days before harvest).³⁶ This initial irrigation can be sequenced so as to help stagger the harvest and need for labor.³⁷ Following this first irrigation the crust of the field must be tilled or broken at the shallow depth of 5 – 10 cm in order to assist in flower emergence.³⁸

The second irrigation takes place 4 – 5 weeks after the first if there is insufficient rainfall and should continue on 12 – 14 day intervals until mid-May, or the foliage begins to yellow.³⁹ This post-harvest irrigation helps the plants to finish their growth and corm development for the next year. During the irrigation period and the following five-month dormancy, it is important to keep the fields weeded to prevent moisture loss from the fields.⁴⁰ The *crocus*' dormant period coincides with the low water period for many areas, as well as the high water need season of many other agricultural plants.⁴¹ The irrigation of *Crocus sativus L.* through the summer has been found to be harmful to the corm and can increase the risk of fungus. However, some regions do attempt an August irrigation which, while risky, can have positive results on flower yield.⁴²

Harvest

The yield of *crocus* flowers is generally low in a field's first year and increases until a production peak is reached in the fourth and fifth years. Following these peak yield years the field will decline in productivity. Table 1 displays the yearly average saffron yields over an eight year period. DACAAR has recommended reducing the average field age from eight years to four or five years.⁴³

Table 1

Saffron Yields in Different Years of Field Age ⁴⁴		
Age of the Field	Flower Yield (kg/ha)	Dry Saffron Yield (kg/ha)
1 st Year	100	1.32
2 nd Year	400	3.95
3 rd Year	600	7.80
4 th Year	800	10.50
5 th Year	1,000	13.20
6 th Year	700	9.15
7 th Year	600	7.80
8 th Year	400	5.20
Average of 8 Years	562.5	7.36

With 150,000 to 170,000 flowers required per kilogram of saffron, the harvest of the *crocus* flower is a tedious process.⁴⁵ The harvest begins roughly 10 – 25 days after the initial irrigation⁴⁶ (usually October to November in Afghanistan) and must be done daily as the flowers only live 48 hours.⁴⁷ Many regions harvest in the mornings when it is believed the picking is easier, as the flowers are still closed. A good laborer can harvest up to 3,000 flowers per hour.⁴⁸

The flowers may be stored for brief periods if kept cool, shaded, and stacked no deeper than 10 cm to prevent quality loss and crushing. If flowers are to be kept longer prior to separation of the stigma, they must stored at 0°C for no more than seven days.⁴⁹

Figure 2. Women harvesting of *Crocus sativus* L. Note the wearing of gloves to prevent contamination.⁵⁰



Figure 3. A *Crocus sativus* L. field ready for harvest.⁵¹



Refinement

The removal of the three stigmas from the flower and drying are the two stages of refinement into saffron the spice. The refinement process is perhaps the most critical in the production of saffron, as it is the quality of the spice that demands premium prices. The refinement process must be done in clean dust-free environments; it is not unusual to see workers wearing hairnets, gloves, and masks to prevent contamination of the saffron. The stigma must be removed promptly from the flowers to quickly begin the drying and prevent possible fungal growth. The stigmas are removed from the flower, and, depending on the market or buyer's preference, the upper red portion of the stigma is separated from the lower yellow style. Some buyers like to see the saffron tied in bundles with the presence of the attached style as proof that loose styles are not mixed in with the saffron, which would alter the purity of the product unbeknownst to the buyer. (See Figure 5.)⁵²

Following the separation of the stigma, the next step is to dry the saffron to a moisture level of 10% to 14%.⁵⁴ It is important not to over dry the saffron because it will lose weight and become brittle, lowering its value.⁵⁵ There are three methods of drying: air drying, electric driers, and dehydrators.

Air drying is the traditional practice and can take up to a week to complete.⁵⁶ It is important to air dry the saffron in areas free of contaminants and direct sunlight. A low container such as a tray or large plate covered with a thin cloth is ideal for air drying.⁵⁷ The length of time required in air drying may be a limiting factor due to the increased risk of fungal growth and the poorer rate of accuracy in attaining the optimal level of moisture.⁵⁸

The use of electric dryers is inexpensive and takes minutes rather than days to complete the drying process. Quick drying times have been shown to improve color retention, and electric driers also allow for more accurate moisture levels. The drying temperature should be 70°C for six minutes or 110°C for 2 minutes.⁵⁹ While

Figure 4. Workers complete the first step of saffron refinement by separating the stigma from the *crocus* flower⁵³



providing electric driers to Afghan farmers would be relatively inexpensive, it would require access to electricity, which may not be available.

Dehydrators may also be used to dry the saffron. The saffron should be dried at 48°C for 48 hours.⁶⁰ Kiln driers are available that allow closer control of both temperature and moisture and thus increase the quality, but their cost is prohibitive.⁶¹

Figure 5. *Crocus stigma* with styles attached bundled for sale.⁶²



Corm Multiplication

The *Crocus sativus L.* plant is sterile and must reproduce through the multiplication of corms. As the mother corms multiply, the daughter corms (which are genetically identical) develop on the surface of the mother. As the years pass, the daughter corms begin to work their way to the surface of the field, especially in irrigated scenarios. In Spain, where irrigation is dominant, the corms are lifted (removed from the field) every four years or so, while in Kashmir, where little irrigation is practiced, fields may go 12 years.⁶³

In Afghanistan, Iran, and Kashmir corms are usually lifted in June and transplanted as soon as weather allows. The corms are generally transplanted by August to early October. There are reports from Khorasan province in Iran indicating that April through June may be the preferred season for lifting corms.⁶⁴

The rate of corm multiplication is dependent on the size of an initial corm. When lifting is done from a dry corm bed, the corms selected for replanting should be in the 6 to 8 gram weight range and be between 2.5 to 3 centimeters in diameter.⁶⁵ In rare cases, corms lifted from a dry bed may be stored for a few days in a dry room at 3° to 5°C with good ventilation. However, the book *Saffron Production and Processing* strongly recommended that corms not be stored as it can negatively impact their flowering rate.⁶⁶ When the corms are lifted from a moist or irrigated field, the corm selection should be based on much heavier weights of 20 to 30 grams and must be immediately planted into a new field.⁶⁷

Difficulties in storing corms as well as their fragility in shipping are two of the limiting factors of saffron production. These two limitations are contributors to the largest inhibitor of growth in the saffron industry: access to sufficient numbers of quality *Crocus sativus L.* corms.⁶⁸ The supply and demand aspect of corms has driven the planting price to approximately \$5,000 USD per hectare.⁶⁹ Today there are efforts by organizations like Crocus Bank that provide corms to Afghan organizations but much of Afghanistan's saffron still comes from corms derived from the original Iranian samples smuggled in the early 1990s.⁷⁰

Once the corms have been lifted from a field it should be left fallow or have a new crop rotated into planting. When selecting a crop for rotation with the *crocus*, the focus should be on cereals and pulses. Potatoes, beets, and alfalfa are poor choices to precede or follow the *crocus*.⁷¹

IV. The Economics of Saffron

World Production

While Spain is the country traditionally most closely associated with saffron production, in fact, Iran produces the lion's share of saffron, accounting for approximately 90% of global production.⁷² Greece, India (Kashmir), Spain, and Morocco, among others, account for the remaining 10%, each typically producing less than 5,000 kg (5 metric tons) per year.⁷³ Table 2 shows the global saffron production figures for the top producers in 2004 and 2005.ⁱ Average annual saffron production in Afghanistan is less than 500 kg (half a metric ton). See Table 3 for the estimated total saffron produced in Afghanistan over the last five years.

Table 2

Global Saffron Production, 2004 – 2005 ⁷⁴						
	Iran	Greece	India	Spain	Morocco	Other
2004	180,000 kg	3,000 kg	2,000 kg	1,000 kg	1,000 kg	3,000 kg
2005	230,000 kg	5,700 kg	2,300 kg	No Data	2,300 kg	5,400 kg

Over the last 20 years, cultivated land area for saffron has significantly decreased in EU countries as a result of increasing labor costs. Saffron production in Spain, for example, has fallen dramatically since 1991, from nearly 25,000 kg (25 MT) per year to less than 5,000 kg (5 MT) per year since 2000.⁷⁵ In 2004, Spain only produced 1,000 kg (1 MT). Alternatively, Iran's cultivated land area for saffron has grown at an average annual rate of nearly 25% over the last two decades.⁷⁶ The UAE, Spain, Saudi Arabia, France and Italy are among the largest importers of Iranian saffron, which is often imported in bulk, then packaged under the packing company's (or importing country's) brand name, and re-exported to other countries at a significant mark-up. Spain alone processes and re-exports close to 40% of Iran's saffron production.⁷⁷

Market Price – Farm-Gate to Retail

It is difficult to produce reliable pricing figures for saffron for a number of reasons. First, variations in quality (which will be discussed in more depth later) have a significant impact on price. Second, much of the reporting on pricing is either anecdotal (i.e. a single point of purchase, which is not necessarily representative of the larger market), incomplete (e.g. the level of quality is not reported), contradictory, or simply suspect.ⁱⁱ With that in mind, the figures here should not be considered infallible or all-inclusive. Instead, they are intended to give a general picture of the saffron market.

The farm-gate price for saffron, the price that Afghan farmers receive, has steadily increased since 2004, when saffron was first promoted in earnest by NGOs in Afghanistan. In 2004, Afghan farmers received approximately \$170 – \$200 per kg, and by June 2008, saffron was reported to be selling for anywhere between \$1,200 and \$1,800. The table below displays the estimated price Afghan farmers received for saffron between 2004 and 2008.

ⁱ The RRC was unable to find more recent global production figures.

ⁱⁱ For example, according to recent UN Comtrade data, which is based on voluntary country reporting of trade statistics, a kilogram of saffron traded for as low as \$0.20 and for more than \$2,000.

Table 3

Afghan Saffron Cultivation and Farm-Gate Price (est.), 2004 – 2008 ⁷⁸				
Year	Total Product (kg)	Area Under Cultivation (ha)	Production Rate (kg/ha)	Price/kg (\$USD)
2004	60 kg ⁱⁱⁱ	16 ha	3.75 kg/ha	\$170 – 200
2005	150 kg	40 ha	3.75 kg/ha	\$300 – 350
2006	240 kg	83 ha	2.89 kg/ha	\$400 – 450
2007	400 kg	161 ha	2.48 kg/ha	\$600 – 1,200
2008	800 kg	250 ha	3.2 kg/ha	\$1,200 – 1,800

Poor yields in Afghanistan and Iran in 2006 resulted in higher farm-gate prices that year. In 2007, cold weather coupled with a severe drought in Iran caused another jump in price. The wide range in the farm-gate prices for 2007 and 2008 is due to alternative pricing data reported by NGOs involved in saffron production in Afghanistan. A joint WSU / ICARDA report lists the farm-gate price of Afghan saffron in Herat in 2007 as \$600 – \$800, while DACAAR lists the price/kg that year as \$1,200. In 2008, DACAAR lists the price of saffron as \$1,800, while Catholic Relief Services lists a more conservative range of \$1,100 – \$1,400 per kg. Depending on which set of pricing figures one uses, according to the data above, the farm-gate price of saffron has increased between 65% and 85% annually since 2004.

A joint DACAAR, ICARDA, and UK Department for International Development (DFID) report listing the expenses and income over a five year period for a typical Afghan farmer cultivating one hectare (5 jeribs) of land (see Table 4). The authors estimate the net income over five years for a farmer to be 679,117 afghanis (AFN), which breaks down to an annual net income of 135,823 AFN, or \$2,724 per year.^{iv} The authors also estimate that over a five year period one hectare will yield approximately 22,000 kg of corms, but only about half (11,000 kg) will be adequate for planting or selling. The methodology by which these figures were arrived is unclear, but they are useful for providing a general picture.

Table 4

Estimated Expenses and Income for 1 hectare for 5 years				
Inputs/Expenses			Income	
Items	Est. Amount (AFN)		Items	Est. Amount (AFN)
Land preparation	12,500		Saffron spice	1,200,000
Animal Manure	36,000		Corms	82,500
Corm (planting materials)	300,000		Dried leaves (livestock feed)	10,000
Planting of corm	16,633			
Corm treatment	10,000			
Weeding	90,500			
Breaking soil crust	29,000			
Flower harvesting	10,500			
Irrigation	18,000			
Processing (separation, drying, etc.)	90,250			
TOTAL	613,383 AFN (\$12,302)		TOTAL	1,292,500 AFN (\$25,922)

ⁱⁱⁱ Other sources claim that the total 2004 production in Afghanistan was as high as 430 kg. See Altai Consulting, "Market Sector Assessments: SME Development," March 2005, prepared for UNDP, Kabul, 44, http://undp.org.af/Publications/KeyDocuments/Final_Report_MSA_SME_Altai_Cons_July_14th_2005.pdf

^{iv} The RRC calculated the \$USD figures using the May 17, 2009 exchange rate of 49.86 AFN per 1 USD.

Table 5 shows the annual change in trade value of saffron imports to the U.S. between 2001 and 2008. While not necessarily representative of global saffron trade, the table is intended to provide a sense of the change and direction of saffron trade value over the last decade. Because of its accessibility, reliability, and consistency, only U.S. trade data was used.^v Note the general upward trend in the trade value of saffron to the U.S. since 2001. There were only two years when the saffron trade value dropped – and then, no more than about 5%. The yearly increases, on the other hand, have been more common and pronounced. (For more detailed data showing actual figures on annual trade value and net weight between 2001 and 2008, refer to Tables 9 and 10 in the Appendix.)

Table 5

U.S. Saffron Imports' Annual Change (%) in Trade Value, 2001 - 2008							
Country	2001 - 2002	2002 - 2003	2003 - 2004	2004 - 2005	2005 - 2006	2006 - 2007	2007 - 2008
Afghanistan	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Belgium	N/A	N/A	N/A	N/A	-100.0%	N/A	N/A
Brazil	N/A	-100.0%	N/A	N/A	N/A	N/A	-100.0%
China	N/A	N/A	N/A	N/A	0.2%	52.8%	-100.0%
Costa Rica	-100.0%	N/A	N/A	N/A	N/A	N/A	N/A
Dominican Rep	N/A	-100.0%	N/A	N/A	N/A	N/A	N/A
France	N/A	60.6%	189.6%	-54.9%	21.9%	-17.9%	53.7%
Germany	N/A	N/A	N/A	N/A	-100.0%	N/A	-100.0%
Greece	-100.0%	N/A	233.2%	-22.8%	18.2%	1.6%	162.5%
Guyana	N/A	N/A	-100.0%	N/A	N/A	N/A	N/A
India	-100.0%	N/A	-59.7%	147.6%	17.2%	99.7%	116.5%
Indonesia	N/A	N/A	N/A	N/A	-100.0%	N/A	N/A
Iran	27.6%	7.1%	11.0%	-2.5%	-2.6%	-42.2%	144.6%
Italy	-42.8%	145.2%	-31.7%	23.7%	-25.0%	17.7%	40.2%
Lebanon	N/A	N/A	N/A	-100.0%	N/A	N/A	17.6%
Mexico	-65.5%	-100.0%	N/A	-100.0%	N/A	N/A	N/A
Morocco	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New Zealand	N/A	N/A	-33.3%	-22.2%	92.9%	-66.7%	-100.0%
Peru	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	N/A	N/A	N/A	N/A	N/A	-100.0%	N/A
Spain	-6.1%	25.1%	-0.6%	-3.4%	18.2%	20.2%	61.3%
Switzerland	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Syria	N/A	N/A	N/A	N/A	N/A	-56.5%	-100.0%
Thailand	N/A	N/A	N/A	N/A	N/A	N/A	-100.0%
Trinidad/Tobago	-11.0%	5.2%	-9.9%	-80.1%	508.2%	36.0%	-87.8%
UAE	N/A	N/A	-100.0%	N/A	N/A	-100.0%	N/A
UK	N/A	N/A	N/A	1068.5%	-100.0%	N/A	1659.8%
TOTAL	-5.1%	26.9%	0.7%	-2.8%	15.8%	16.8%	64.1%

On the other end of the market price spectrum is the retail price, or price the consumer pays. Table 6 shows current (May 2009) prices for saffron sold by retailers in the U.S. and Europe. For comparative purposes, the prices listed are for reportedly “Category 1” or “premium” saffron threads, and not saffron powder, which can cost slightly more or less. (The differences in grades of quality is explained in more detail later in “Marketing Issues: Part II” under the sub-heading “*Strategy I: Branding Quality – Testing for Quality and Adhering to Food Safety.*”) Additionally, the purchase prices listed do not include shipping rates, and all prices originally in foreign currencies were converted here to \$USD.⁷⁹ The “Quantities for Purchase” column includes the smallest and largest (if applicable) quantity for sale by the retailer, and the

^v A larger comparative analysis with other countries was not possible due to limited, contradictory, or incomplete trade data statistics.

“Purchase Price” column lists the price for the two quantities. The final column shows the total price per kilogram the retailer will receive, the range in each being the difference in price based on the quantity purchased (e.g. the consumer pays a lower price per gram if purchasing 100 grams as opposed to only 1 gram). Note the variation in price per kg, particularly the increase in price for organically grown saffron.

Table 6

Consumer Market Prices for Premium (Category 1) Saffron (as of May 2009)			
Company	Quantities for Purchase	Purchase Price (\$USD)	Price (\$USD) per kg
Chef Depot ⁸⁰	½ - 1 oz.	\$54.95 – 89.95	\$3,172 – 3,876
GrandFood.com ⁸¹	1 oz	\$108.75	\$3,836
Vanilla, Saffron Imports ⁸²	½ gram – 1 oz.	\$4.75 – 119	\$4,197 – 9,500
Whole Spice ⁸³	1 gram – 1 oz.	\$13 – 148	\$5,220 – 13,000
Sahar Saffron ⁸⁴	½ oz (Spanish saffron)	\$89	\$6,278
La Tienda	1 gram – 1 oz.	\$14.95 – 199	\$7,020 – 14,950
Sahar Saffron ⁸⁵	1 – 100 grams (Persian saffron)	\$12 – 750	\$7,500 – 12,000
Sahar Saffron ⁸⁶	1 – 50 grams (Kashmiri saffron)	\$15 – 475	\$9,500 – 15,000
Brightwater Gold Saffron ⁸⁷	1 – 10 grams (organic New Zealand)	\$11.96 – 95.66	\$9,566 – 11,960
Safran du Gatinais ⁸⁸	0.5 – 6 grams (organic French)	\$14.84 – 103.89	\$17,315 – 29,680
Starwest Botanicals ⁸⁹	¼ oz. (organic)	\$134.08	\$18,918

A comparison between the 2008 data in Tables 3 and 6 reveals that the mark-up from farm-gate to retail can be as low as 135% and as high as 1,160%.^{vi}

V. Marketing Issues, Part I – What is being done in Afghanistan?

Favorable climatic and soil conditions, coupled with saffron’s high value and Afghanistan’s proximity to major processors and distribution channels (i.e. Iran), make saffron an ideal crop. Additionally, higher labor costs in Europe and other countries give Afghanistan a competitive advantage. Still, the saffron industry in Afghanistan is far from mature. Farmers have limited experience growing, processing, and above all, marketing saffron and require both training and funding. Also, Afghan saffron is still an unknown “brand” in that saffron buyers are unfamiliar with the consistency of its quality. On the one hand, this is a limiting factor since buyers are more likely to purchase a brand they know and trust. On the other hand, this is an opportunity for Afghan saffron growers to make a name for their product (both figuratively and literally) at this early stage by breaking into the global saffron market with a quality product at a competitive price. Of course, that is easier said than done, but farmers and the organizations supporting them are well aware of the opportunities and constraints in promoting the saffron industry in Afghanistan.

Saffron in Afghanistan: Key Facts and Figures

Afghan refugees in Iran were the first to bring over and plant saffron in western Afghanistan (Ghoryan) upon their return in 1991-1992.⁹⁰ In 1998, DACAAR introduced saffron growing to farmers in Pashtun Zarghun, Herat,⁹¹ and since 2004, a number of NGOs and other local and international organizations have begun to promote saffron in Afghanistan as an alternative livelihood.^{vii} DACAAR, ICARDA and DFID’s Research in Alternative Livelihoods Fund (RALF) are the key organizations working with Afghan farmers to produce and market saffron. To date, most of their efforts have been focused in Herat, providing corms, training staff and farmers, establishing saffron growers associations, and assisting in marketing strategies. NGOs have provided training in cultivation, processing, and marketing for farmers from Badghis, Ghor, Helmand, Herat, Kandahar, Kunar, Laghman, Nangarhar, and Uruzgan.

^{vi} Where the data includes a range of numbers, the RRC calculated these figures using the average of the range (i.e. \$1,500 for the 2008 data in Table 3 and \$3,524 for the lowest price per kg in Table 6).

^{vii} For a complete list of NGOs and other organizations involved in promoting saffron as an alternative livelihood in Afghanistan, refer to Table 12 in the Appendix.

It is unclear exactly which provinces and districts currently grow saffron. A 2005 report notes that saffron was being grown in 21 districts in seven provinces. The RRC was able to confirm that saffron is, at the very least, being grown in seven districts in Herat, as well as in the provinces of Badghis (Qadis), Ghor (Shahrak), and Kandahar (Maiwand).⁹² The following additional facts and figures are intended to provide a snapshot of the saffron industry in Afghanistan as of 2008.⁹³

- 1,300 saffron farmers
- At least 9 saffron growers associations (There are likely more.)
- 2 women's saffron growers associations
- 250 hectares of land under cultivation
- Average yield is 3.2 kg/ha^{viii} (Refer to Table 8 in the Appendix for a country comparison of average yields.)
- Herat market price for saffron (June 2008) \$1,200 – 1,400 USD/kg^{ix}
- At least 3 private production and marketing companies
- 1 quality test lab (at MAIL Herat)

Presently, total Afghan saffron production is very low, and finding a buyer is not difficult. Iranian traders purchase most of the saffron produced in Afghanistan. The saffron is then integrated into the larger saffron market in Iran and exported as Iranian saffron. Afghan farmers sell the bulk of their saffron to Iranian merchants for the simple reason that Iran is tied in to the global saffron market, and Afghanistan is not, which puts farmers in a poor negotiating position. The largest global producer and exporter of saffron right next door, Iran can easily absorb the miniscule amount of saffron that Afghan farmers currently produce.⁹⁴ The challenge for Afghan farmers is to get the highest possible price for their saffron, which will be discussed in more detail in “Marketing Issues: Part II.”

VI. Marketing Issues, Part II – What more could be done in Afghanistan?^x

Peter Wyeth, Associate Economist at Washington State University, and Najib Malik, RALF Program Manager, ICARDA, offer two complementary marketing strategies based on field research in Herat in 2008 that aim to give Afghan farmers the highest possible return on saffron.⁹⁵

- The first strategy deals with branding – create a reputation, or identity, for Afghan saffron as being of the highest quality.
- The second strategy is to connect Afghan producers more directly to the world market.

Strategy I: Branding Quality – Growing and Processing

The first crucial step is teaching farmers the necessary inputs and requirements for producing superior quality saffron. The proper selection of corms, planting depth and spacing, irrigation, fertilization, harvesting, drying, and storing are all aspects that affect the quality of the end product. As all of these issues were discussed earlier in great detail there is no need to do so here.

Strategy I: Branding Quality – Testing for Quality and Adhering to Food Safety

While some measure of saffron quality can be judged by sight, the only real test for quality must be done in a laboratory using photospectrometry. Saffron quality is measured according to the standards developed by the International Organization for Standardization based in Switzerland. The standards for saffron are laid out in ISO 3632, which defines four categories, or grades, governing color intensity (crocine), flavor (picrocrocine), and aroma (safranal). In regards to quality, the measure that producers and retailers look most closely at is color. ISO 3632 stipulates that the highest classification for saffron is “Category 1,” which requires a minimum coloring strength of 190. The highest quality saffron is generally

^{viii} DACAAR gives conflicting data on 2008 yields, noting it is both 3.2 kg/ha and 6-7 kg/ha.

^{ix} As noted in Table X, DACAAR lists the 2008 price as \$1,800.

^x This section is largely drawn from fieldwork conducted by Peter Wyeth, Associate Economist at Washington State University, and Najib Malik, Research in Alternative Livelihoods Fund (RALF) Program Manager, ICARDA. For more information, see Peter Wyeth and Najib Malik, “A Strategy for Promoting Afghan Saffron Exports,” 2008.

in the 220 to 250 range and contains only the red stigmas.⁹⁶ Table 7 shows the minimum testing requirements for the four grades of saffron.

Table 7

ISO 3632 Minimum Criteria for Saffron ⁹⁷				
	Category I	Category II	Category III	Category IV
Crocine (color)	190	150	110	80
Picrocrocine (flavor – bitterness)	70	55	40	30
Safranal (aroma)	20 – 50	20 – 50	20 – 50	20 – 50

Another set of standards that Afghan farmers should adhere to is the Hazard Analysis and Critical Control Points (HACCP), a set of international food safety standards that applies to food handling and processing. The HACCP principles provide simple guidelines on identifying, evaluating, and controlling food safety hazards. While certification of saffron-processing operations is not required (at least as far as the U.S. is concerned), Afghan saffron producers would do well to adhere to the HACCP guidelines. The HACCP principles are also incorporated into the food handling safety regulations of the ISO, U.S. Food & Drug Administration, United Nations Food and Agriculture Organization, and the World Health Organization.⁹⁸

Strategy I: Branding Quality – Targeting Niche Markets

There is increasing consumer interest, especially in the West, for products certified as “organic” or “fair trade,” in spite of the higher price tag that typically comes with the label. As can be seen in Table 6, the price of organic saffron on the consumer market can be as high as \$18,900 per kg. The U.S. Department of Agriculture’s National Organic Program stipulates certain regulations for certification.^{xi} The following stipulations should be noted by saffron producers in Afghanistan:⁹⁹

- Chemical fertilizers and pesticides cannot be used for three years prior to the harvested crop. (While the use of pesticides is uncommon among Afghan saffron growers, the use of synthetic fertilizers is not.)
- Animal manure cannot be applied within 90 days of the harvest. (This, of course, is to reduce the chance of contamination by fecal matter.)
- Corms must be organically produced. (NGO reporting says little about the corms that are provided to Afghan farmers, except for perhaps a nod to their supposed “good” or “poor” quality, but it is unlikely that the corms provided are organic.)
- Periodic crop rotation is required. (As noted in the “Necessary Farming Conditions” section, crocus plots should ideally be dug up every 4 – 7 years and left fallow for a year, which satisfies this requirement.)

The purpose of fair trade is to help farmers in developing countries receive a “fair price” for their product. Fair trade principles include the promotion of acceptable labor conditions, direct trade, democratically run growers associations, community development, and environmental sustainability.¹⁰⁰ There are a number of certification organizations. TransFair USA is the only independent certifier of fair trade products in the U.S. and is a member of the international umbrella group Fairtrade Labelling Organizations International (FLO).¹⁰¹ While herbs and spices are among the products that FLO certifies, there are currently no minimum fair trade pricing specifications for saffron.

If the organic or fair trade certification process is either too onerous or impossible at the present time, Afghan saffron growers associations would do well to promote, monitor and publicize adherence to those practices that are consistent with the organic and/or fair trade movements.¹⁰²

Strategy I: Branding Quality – Packaging

Packaging is an important part of maintaining quality. Saffron ideally should be packed in an airtight container that keeps out light. Saffron will deteriorate with prolonged exposure to light and will lose its

^{xi} The International Federation of Organic Agricultural Movements (IFOAM) and International Organic Accreditation Service (IOAS) are two licensed organizations that can conduct certification in Afghanistan.

aroma if packaged in most plastic containers and bags. Packing plants often package saffron in glass containers because the styles are aesthetically attractive to consumers, and at least some measure of quality can be judged by their appearance. But many importers have their own packaging facilities and simply want to purchase saffron in bulk. Whether selling saffron in bulk or already packaged, Afghan producers should have a logo that designates the saffron as originating from a particular area, such as Herat, for example.^{xii} If selling in bulk to retailers who prefer to package the saffron themselves, the regional label should be able to be easily incorporated into the packing company's label.¹⁰³ Regional branding efforts could be coordinated at the provincial level by the various growers associations. If this strategy were taken up at the national level, the Afghan government would have to take a much more active role supporting and regulating the industry.

Strategy I: Branding Quality – Pricing

To give a general idea of the labor involved (which directly affects price), it takes approximately 450,000 stigmas to make 1 kg of saffron. As each flower has only 3 stigmas, that's 150,000 flowers per kg of saffron, and all the separation must be done by hand. On average, it takes a person approximately 50 minutes to pick 1,000 flowers – that is, 125 hours per kg. It then takes a person approximately two hours to remove the stigmas of 1,000 flowers – that is, 300 hours per kg.¹⁰⁴ On top of the 425 man hours (125 + 300 hrs) required per kg, it takes an additional full day to sort the stigmas before drying and packaging.¹⁰⁵

Afghanistan has not yet developed a reputation for high quality that could demand premium prices, and alternatively, trying to undercut the market by selling at unreasonably low prices only makes sense if dealing with large volumes. Wyeth and Malik recommend “value pricing” at this stage of Afghanistan's saffron industry, that is “[p]rovide good quality and set the price to cover costs and make a good profit, but low enough so that customers feel they are getting good value for their money.” Low quality saffron can be sold to Iranian or other foreign buyers but without the regional Afghan logo, so as not to harm the Afghan brand's budding reputation for high quality. Low quality saffron can also be sold to companies who incorporate saffron into products such as dyed textiles, cosmetics, or perfumes.

Strategy II: Access to World Market – Distribution

The second strategy calls for better access to, and understanding of, the global saffron market, and is equally significant to the first strategy of creating a quality reputation for Afghan saffron. Wyeth and Malik write:

[H]igh quality and a good reputation will not automatically lead to higher prices for Afghan farmers. They must be negotiated by people who understand the market well... At present, because they have no communication themselves with buyers in other countries, they have to sell to traders who do. When demand is good and supply short, those traders have an incentive to keep this information from farmers rather than pass it on them. Even when farmers are able to learn that conditions are favorable to them, their ability to negotiate is limited because they have not been able to bypass local traders and sell directly overseas.¹⁰⁶

The distribution chain from the Afghan farmer to the consumer is a long one, incorporating multiple layers of transactions between local traders, wholesalers, exporters, importers, packaging companies, re-exporters, and retailers. A fundamental principle for Afghan saffron growers seeking higher prices is to shorten the distribution chain (i.e. cut out the middle man). The best avenue to pursue such a strategy is through the saffron growers associations. Wyeth and Malik recommend that growers associations, which are currently organized below the district level, form an umbrella association at the provincial level that will act on behalf of the various saffron growers associations and farmers and will be directly involved in marketing, promotion, and developing contacts with buyers overseas.¹⁰⁷

Strategy II: Access to World Market – Promotion

Following the lead of other saffron suppliers with direct access to growers, a relatively simple way to begin promoting Afghan saffron is to set up a website that would serve to educate buyers on saffron

^{xii} Spain's La Mancha region, for example, developed a reputation for quality long ago that is well-known throughout the world.

quality in general, advocate the unique quality characteristics and processing of Afghan saffron (ISO quality and HACCP standards), facilitate the sale of the saffron directly to the consumer, and provide contact information of individuals directly involved in marketing to foreign importers. Calling attention to growers' adherence to certain organic/free trade principles, as well as to the personal stories of some of the farmers themselves would likely appeal to certain niche markets. Wyeth and Malik also suggest visiting retailers in Dubai's Gold Souq where saffron is sold and reaching out to potential buyers.¹⁰⁸

VII. Final Thoughts

Saffron as an Alternative Livelihood Crop

This report focuses primarily on cultivation, processing and marketing of saffron as an industry in its own right, but the RRC would be remiss not to at least touch on the issue of saffron as a licit alternative livelihood crop. Saffron, like poppy, is a high value, low weight, labor-intensive crop with minimum demands on water. The original impetus behind promoting saffron in Afghanistan was to assess its viability and profitability as an alternative crop to poppy production. However, saffron was never intended to be an "economic rival" to poppy.¹⁰⁹ A comprehensive (and accurate) comparative economic analysis of the two crops is difficult because 1) the saffron industry in Afghanistan is still quite young, so there is little data over time, and 2) the data that exist are based on estimates. With that in mind, preliminary calculations by DACAAR and WSU show that while saffron is significantly more profitable than crops such as wheat, onions, and chick peas, it is still less profitable than poppy. According to the figures, poppy is estimated to be more than 50% more profitable than saffron. The authors of the study write:¹¹⁰

While this is unfortunate it is not surprising. Because poppy is illegal, premium prices have to be paid to persuade growers to break the law. If by chance any crop were [to] bec[o]me as profitable as poppy it would probably not take buyers long to raise the price they pay for opium. Hoping that farmers can be diverted from poppy production by economic incentives alone is therefore not realistic.

Support for a saffron industry without a partnering effort to dissuade the production of opium may be insufficient to motivate Afghan farmers to alter their farming habits.

Challenges

While there are certainly opportunities in regards to saffron as an alternative crop, the fledgling industry currently relies heavily on support from NGOs and the government. If the saffron industry is to expand, training workshops and demonstration plots will have to be set up in other parts of the country, which may tax the efforts of NGOs such as DACAAR, and nominally high start-up costs mean continued financial support or the establishment of micro-credit programs.

Market competition is currently not a serious issue. Total Afghan saffron production is so insignificant that it remains "under the radar" and is easily absorbed into other saffron markets. It would be optimistic at this stage to imagine a premium Afghan saffron brand as a threat to other premium saffron producers. The pressing challenges at this point are to begin to develop a reputation for consistent premium quality and to gain more direct access to the global saffron market.

Appendix**Table 8**

Country Comparison of Saffron Area, Production and Productivity ¹¹¹			
Country	Total Product (kg)	Area Under Cultivation (ha)	Production Rate (kg/ha)
Spain	5,000 kg	600 ha	7.84 kg/ha
Italy	240 kg	29.4 ha	6.16 kg/ha
Azerbaijan	3,700 kg	675 ha	5.48 kg/ha
Greece	4,300 kg	1,000 ha	4.30 kg/ha
Afghanistan	250 kg	800 ha	3.2 kg/ha
India	6,460 kg	2,825 ha	2.28 kg/ha
Morocco	1,000 kg	500 ha	2.00 kg/ha

Table 9

U.S. Saffron Imports by Value & Weight, 2001 - 2004								
Country	2001		2002		2003		2004	
	Trade Value (\$USD)	Net Weight (kg)	Trade Value (\$USD)	Net Weight (kg)	Trade Value (\$USD)	Net Weight (kg)	Trade Value (\$USD)	Net Weight (kg)
Afghanistan	0	0	0	0	0	0	0	0
Belgium	0	0	0	0	0	0	0	0
Brazil	0	0	4,872	4	0	0	0	0
China	0	0	0	0	0	0	0	0
Costa Rica	2,080	2	0	0	0	0	0	0
Dominican Rep	0	0	2,520	2	0	0	0	0
France	0	0	36,406	68	58,470	146	169,330	1,149
Germany	0	0	0	0	0	0	0	0
Greece	4,615	10	0	0	5,471	18	18,232	31
Guyana	0	0	0	0	4,295	4	0	0
India	14,490	10	0	0	41,243	30	16,609	13
Indonesia	0	0	0	0	0	0	0	0
Iran	223,005	438	284,544	499	304,862	619	338,501	662
Italy	113,421	113	64,860	220	159,007	434	108,655	185
Lebanon	0	0	0	0	0	0	2,600	2
Mexico	10,257	9	3,535	3	0	0	0	0
Morocco	0	0	0	0	0	0	0	0
New Zealand	0	0	0	0	6,750	3	4,500	2
Peru	0	0	0	0	0	0	0	0
Portugal	0	0	0	0	0	0	0	0
Spain	4,629,472	13,850	4,347,820	11,359	5,438,155	13,792	5,406,237	15,655
Switzerland	0	0	0	0	0	0	0	0
Syria	0	0	0	0	0	0	0	0
Thailand	0	0	0	0	0	0	0	0
Trinidad/Tobago	14,609	15	13,000	13	13,675	12	12,325	11
UAE	0	0	0	0	4,085	5	0	0
United Kingdom	0	0	0	0	0	0	3,850	1
TOTAL	\$5,011,949	14,447	\$4,757,557	12,168	\$6,036,013	15,063	\$6,080,839	17,711

Table 10

U.S. Saffron Imports by Value & Weight, 2005 - 2008								
Country	2005		2006		2007		2008	
	Trade Value (\$USD)	Net Weight (kg)	Trade Value (\$USD)	Net Weight (kg)	Trade Value (\$USD)	Net Weight (kg)	Trade Value (\$USD)	Net Weight (kg)
Afghanistan	0	0	0	0	0	0	2,024	1
Belgium	11,220	10	0	0	0	0	0	0
Brazil	0	0	0	0	2,918	3	0	0
China	18,268	17	18,300	17	27,958	26	0	0
Costa Rica	0	0	0	0	0	0	0	0
Dominican Rep	0	0	0	0	0	0	0	0
France	76,320	383	93,074	502	76,378	243	117,395	285
Germany	5,784	11	0	0	8,039	7	0	0
Greece	14,076	41	16,636	23	16,895	7	44,354	21
Guyana	0	0	0	0	0	0	0	0
India	41,123	29	48,195	48	96,240	48	208,383	221
Indonesia	3,354	9	0	0	0	0	0	0
Iran	330,083	773	321,640	770	185,942	182	454,846	285
Italy	134,380	178	100,747	97	118,570	300	166,213	176
Lebanon	0	0	0	0	3,400	3	4,000	4
Mexico	3,882	4	6,512	6	0	0	10,831	10
Morocco	0	0	0	0	0	0	11,872	11
New Zealand	3,500	2	6,750	3	2,250	2	0	0
Peru	0	0	0	0	0	0	57,545	53
Portugal	0	0	3,505	3	0	0	0	0
Spain	5,221,173	16,441	6,168,939	14,805	7,417,241	12,439	11,965,957	13,971
Switzerland	0	0	0	0	0	0	4,350	4
Syria	0	0	4,703	4	2,044	2	0	0
Thailand	0	0	0	0	14,850	14	0	0
Trinidad/Tobago	2,448	2	14,888	14	20,246	20	2,464	2
UAE	0	0	43,052	94	0	0	0	0
United Kingdom	44,988	104	0	0	4,026	1	70,849	30
TOTAL	\$5,910,599	18,004	\$6,846,941	16,386	\$7,996,997	13,297	\$13,121,083	15,074

Table 11

The Saffron Production Cycle												
Production Activity	Month Activity Takes Place											
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Fertilizer Application and Deep Tilling												
Periodic Light Tilling												
Planting of Corms												
First Irrigation												
Flower Appearance and Harvest												
Irrigation every 12-14 Days												
Refinement of Stigma												
Foliage Cutting for Fodder												
Lift Daughter Corms												
Daughter Corms Forming												
Root and Leaf Development												

Table 11

NGOs and Other Organizations Promoting Saffron in Afghanistan			
Implementing Organization	Project Start Date	Project Locations	Project Activities
CRS (Catholic Relief Services)	2003	Herat, Bamyan	CRS has supplied corms to farmers, conducted field surveys, and provided training in growing, harvesting and marketing.
DACAAR (Danish Committee for Aid to Afghan Refugees)	1998	Herat and other locations	Arguably the most active NGO promoting saffron, DACAAR has conducted training workshops and socio-economic surveys, and has provided corms to farmers.
DFID (UK Department for International Development)	2004	Herat	DFID, through its RALF (Research in Alternative Livelihoods Fund) program, seeks to identify and promote sustainable
GSE (Growing Sales Exchange)	2006	Herat	GSE, a Dutch saffron company with an office in Herat, received funding from the Dutch government to promote saffron production and marketing in Afghanistan.
Herat University, Faculty of Agriculture	--	Herat	Equipped with a research facility.
ICARDA (International Center for Agricultural Research in the Dry Areas)	2004	Herat	ICARDA has partnered with DACAAR, DFID, WSU and others to research and promote saffron as an alternative livelihood in Afghanistan.
MAIL Herat (Ministry of Agriculture, Irrigation and Livestock)	--	Herat	MAIL Herat is equipped with a research facility and quality control lab where ISO standards testing can be done.
USAID (U.S. Agency for International Development)	--	--	USAID, through its ASMED (Afghanistan Small & Medium Enterprise Development) program, is collaborating with both public and private organizations to develop a coordinated approach to support the saffron sector.
WSU (Washington State University)	2004/2005	Herat	WSU has partnered with DACAAR, ICARDA, MAIL Herat and Herat University to conduct field research on the profitability of saffron as an alternative livelihood.

SABZI PILAU RECIPE
(Rice with saffron, spinach, and meat)¹¹²

3 tablespoons butter or vegetable oil
 2 large onions (diced)
 2 pounds boneless shoulder of lamb or beef (cut into 2 inch cubes)
 2 cups water
 1 tablespoon salt
 1 teaspoon ground cinnamon
 1 teaspoon ground cloves
 1 teaspoon ground coriander
 ½ cup chopped green onions
 ½ cup chopped fresh parsley
 ½ cup chopped celery leaves
 ½ cup chopped fresh mint
 12 cups water
 4 tablespoons salt
 2½ cups long—grained rice (soaked in water)
 1 tablespoon butter
 1 teaspoon saffron

- In a large pan, heat the 3 tablespoons of butter or oil and brown the diced onions and meat. Add the 2 cups of water, the 1 tablespoon salt, cinnamon, cloves and coriander and simmer for 20 – 30 minutes until the meat is cooked and the liquid is almost absorbed. Set aside.
- In a bowl, mix the green onions, celery leaves and mint. Set aside.
- Put the 12 cups of water in a large pan and bring to a boil. Add the 4 tablespoons of salt and drained rice and boil uncovered until a grain of rice, when placed between the thumb and forefinger is soft but not able to be mashed (approximately 10 – 15 minutes). Drain the rice in a colander and rinse with hot water to wash the excess salt and starch from the rice. (The rice should not be sticky; if it is sticky, it has been cooked too long.)
- In a large, heavy pan, heat the 1 tablespoon of butter. Add a few spoons of the cooked rice evenly over the bottom of the pan. Then sprinkle a handful of the chopped vegetable mixture over the rice layer and a layer of the meat over the vegetable layer. Continue making rice, vegetable and meat layers until all of the ingredients are used, ending with a layer of rice. (Do not add any water since the vegetable mixture has enough water in it.) Cover the pan with a thin, cotton towel; put the lid on tightly and steam at low heat for 20 – 30 minutes.
- When the rice has finished steaming, mix the saffron with 1 tablespoon of water. Add a few spoons of rice and mix well. Set aside.
- To serve, with a spatula, gently toss the rice, vegetables and meat to mix all the ingredients. Place this mixture spatula by spatula onto a platter and shape into a mound—shape. Sprinkle the saffron/rice mixture over the top. Sabzi Pilau is a traditional New Year’s dish and is usually served with fish (mahi surkh shuda).

The information contained in the report has been compiled by the Human Terrain System (HTS) Research Reachback Center (RRC) at Fort Leavenworth, KS and/or Oyster Point, VA. This report is based on analysis of available open-source material. Products generated within 24-72 hours of the original request should not be considered fully vetted or comprehensive analysis.

- ¹ "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*, New Zealand Institute for Crop and Food Research Ltd., no. 20, (Aug. 2003), <http://paradisessafron.com/saffron.pdf>, (accessed May 2, 2009).
- ² N.S. Gill, "Minoan Art Work, Saffron-Gatherers," *About.com: Ancient/Classical History*, http://ancienthistory.about.com/od/bronzeage/ss/091008Minoan_2.htm (accessed May 11, 2009).
- ³ M. Kafi, A. Koocheki, M.H. Rashed, M. Nassiri, eds., *Saffron (Crocus sativus) Production and Processing*, (Enfield, New Hampshire: Science Publishers, 2006), 3.
- ⁴ N.S. Gill, "Minoan Art Work, Saffron-Gatherers."
- ⁵ MRRD/NABPD/UNDP, "Success Story: Saffron Enterprise-Hirat Province," <http://mrrd-nabdp.org/Data/Success%20Story%20seven.pdf> (accessed April 30, 2009); Moshe Negbi, eds., *Saffron Crocus Sativus L.*, illustrated ed., (Boca Raton, Harwood Academic Publishers and CRC Press, 1999), 106-110; William H. Honan, "Researchers Rewrite First Chapter for the History of Medicine," *The New York Times*, 2 March, 2004, <http://www.nytimes.com/2004/03/02/science/02MEDI.html?ex=1393563600&en=c3177ebac2572d43&ei=5007&partner=USERLAND>, (access May 11, 2009)
- ⁶ Mohammad Hashim Aslami, Erwin O. Nacuray, and Dr. Arif Qaraeen, "Saffron Manual for Afghanistan," *DACAAR*, 14-19, <http://www.icarda.org/Ralfweb/PDFs/SaffronManualForAfghanistan.pdf>, (accessed April 27, 2009).
- ⁷ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 165.
- ⁸ DACAAR, ppt presentation given for the Third Afghan National Conference, November 12, 2008, <http://www.fspp.af/Download/Aslami's%20Presentation%20From%20FSPP.pdf>, (accessed May 3, 2009).
- ⁹ R.K. Giri, S.D. Attri, M.K. Verma, and Siddhartha Singh, "Saffron Productivity and Weather," *India Meteorological Department and Central Institute of Temperate Horticulture*, New Delhi, Sept. 2008, <http://www.indianmetsoc.com/Page40-47.pdf>, (accessed May 3, 2009)
- ¹⁰ Ibid.; Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 40. Aslami et al. "Saffron Manual for Afghanistan," 9-13.
- ¹¹ "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*; Aslami et al. "Saffron Manual for Afghanistan," 9-13.
- ¹² Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 41.
- ¹³ "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*.
- ¹⁴ Aslami et al. "Saffron Manual for Afghanistan," 4.
- ¹⁵ Ibid.; Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 42.
- ¹⁶ Ibid.
- ¹⁷ "Afghanistan: Can Saffron Replace Poppy?," *IRIN*, 6 August 2008, <http://www.irinnews.org/Report.aspx?ReportId=79647>, (accessed May 10, 2009).
- ¹⁸ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 71-73.
- ¹⁹ Ibid., 60-61; Aslami et al. "Saffron Manual for Afghanistan," 4.
- ²⁰ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 67-69; "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*; Aslami et al. "Saffron Manual for Afghanistan," 4, 9; M. Jahani and M. Jahani, "The Effects of Chemical and Organic Fertilizers on Saffron Flowering," (Ferdowsi University of Mashhad, presented II International Symposium on Saffron Biology and Technology, 2007) http://www.actahort.org/books/739/739_9.htm, (accessed 10 May 2009).
- ²¹ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 60.
- ²² Ibid., 60-61.
- ²³ "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*.
- ²⁴ Aslami et al. "Saffron Manual for Afghanistan," 7.
- ²⁵ "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*.
- ²⁶ Aslami et al. "Saffron Manual for Afghanistan," 7.
- ²⁷ Ibid.
- ²⁸ Ibid., 5-7.
- ²⁹ Ibid.
- ³⁰ Ibid.
- ³¹ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 23, 43-45; Aslami et al. "Saffron Manual for Afghanistan," 5-7.
- ³² Ibid.
- ³³ Ibid.
- ³⁴ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 61.
- ³⁵ Ibid., 79-81.
- ³⁶ "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*.
- ³⁷ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 79-81.
- ³⁸ Ibid., 69. Aslami et al. "Saffron Manual for Afghanistan," 11.
- ³⁹ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 79-81.
- ⁴⁰ Ibid. 69.
- ⁴¹ Ibid., 79-81; Aslami et al. "Saffron Manual for Afghanistan," 4.

- ⁴² Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 79-81; Aslami et al. "Saffron Manual for Afghanistan," 10.
- ⁴³ Ibid., 71-73.
- ⁴⁴ Ibid., 173.
- ⁴⁵ Aslami et al. "Saffron Manual for Afghanistan," 14-15.
- ⁴⁶ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 71-73.
- ⁴⁷ Aslami et al. "Saffron Manual for Afghanistan," 14.
- ⁴⁸ Ibid.
- ⁴⁹ Ibid.
- ⁵⁰ DACAAR, *Annual Report 2007*, 12, <http://www.dacaar.org/upload/source/PDF/Annual%20-%202007.pdf> (accessed April 30, 2009).
- ⁵¹ DACAAR, *Annual Report 2006*, 20, <http://www.dacaar.org/upload/Source/PDF/ar2007.pdf> (accessed April 30, 2009).
- ⁵² Aslami et al. "Saffron Manual for Afghanistan," 18.
- ⁵³ DACAAR, ppt presentation given for the Third Afghan National Conference.
- ⁵⁴ Aslami et al. "Saffron Manual for Afghanistan," 18.
- "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*.
- ⁵⁵ Aslami et al. "Saffron Manual for Afghanistan," 18.
- ⁵⁶ Ibid.
- ⁵⁷ Ibid.
- ⁵⁸ Ibid.
- ⁵⁹ "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*.
- ⁶⁰ Ibid.
- ⁶¹ Aslami et al. "Saffron Manual for Afghanistan," 18.
- ⁶² Giri et al., "Saffron Productivity and Weather."
- ⁶³ "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*.
- ⁶⁴ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 65; Aslami et al. "Saffron Manual for Afghanistan," 9.
- ⁶⁵ "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*.
- ⁶⁶ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 65; Aslami et al. "Saffron Manual for Afghanistan," 9.
- ⁶⁷ "Growing Saffron – the World's Most Expensive Spice," *Crop and Food Research*.
- ⁶⁸ Ibid.; Aslami et al. "Saffron Manual for Afghanistan," 7.
- ⁶⁹ Ibid., 1.
- ⁷⁰ "Afghanistan: Research in Alternative Livelihoods Fund (RALF) Quarterly Narrative Report," *International Centre for Agricultural Research in the Dry Areas*, 31 October 2007, http://www.icarda.org/Ralfweb/ProgressReports/Quarterly_August1-November30_2006.pdf, (accessed May 13, 2009); Aslami et al. "Saffron Manual for Afghanistan," 1.
- ⁷¹ Kafi et al., *Saffron (Crocus sativus) Production and Processing*, 60.
- ⁷² M. Ghorbani, "The Efficiency of Saffron's Marketing Channel in Iran," *World Applied Sciences Journal* 4 (2008): 523.
- ⁷³ Peter Wyeth and Najib Malik, "A Strategy for Promoting Afghan Saffron Exports," *Washington State University and ICARDA*, 2008, 7.
- ⁷⁴ Trade Persia, <http://www.tradepersia.com/saffron.htm> (accessed April 27, 2009); Ghorbani, "The Efficiency of Saffron's Marketing Channel in Iran," 523.
- ⁷⁵ Wyeth and Malik, "A Strategy for Promoting Afghan Saffron Exports," 7.
- ⁷⁶ DACAAR, Presentation given at the 3rd National Conference on Afghanistan's Saffron, November 12-13, 2008.
- ⁷⁷ Ghorbani, "The Efficiency of Saffron's Marketing Channel in Iran," 523.
- ⁷⁸ DACAAR, Presentation given at the 3rd National Conference on Afghanistan's Saffron; Wyeth and Malik, "A Strategy for Promoting Afghan Saffron Exports," 3; Catholic Relief Services, "CRS Saffron Activities in Herat Province."
- ⁷⁹ The RRC used the exchange rate on 11 May 2009 from Exchangerate.com
- ⁸⁰ Price of 1 oz of category 1 saffron threads as of May 11, 2009 from "chefdepot.net," <http://www.chefdepot.net/spices.htm>
- ⁸¹ Price of 1 oz of La Mancha category 1 saffron threads as of May 11, 2009 from "grandfood.com," <http://mrcaviarbest.stores.yahoo.net/noname8.html>
- ⁸² Price of 1 oz of Golden Gate Brand category 1 saffron threads as of May 11, 2009 from "saffron.com," <http://www.theposter.com/saffron2.html>
- ⁸³ Price of 1 oz of premium quality Spanish saffron threads as of May 11, 2009 from Whole Spice, <http://www.wholespice.com/frame/default.asp?keyword=saffron>

-
- ⁸⁴ Price of ½ oz of category 1 Spanish saffron threads as of May 11, 2009 from Sahar saffron, <http://saharsaffron.com/SpanshSaffron.htm>
- ⁸⁵ Price of 15 grams of category 1 Persian saffron threads as of May 11, 2009 from Sahar saffron, <http://saharsaffron.com/Persiansaffron.htm>
- ⁸⁶ Price of 20 grams of category 1 Kashmiri saffron threads as of May 11, 2009 from Sahar saffron, <http://saharsaffron.com/Kashmirisaffron.htm>
- ⁸⁷ Price of 10 grams of Brightwater Gold brand organic New Zealand saffron threads as of May 11, 2009 from <http://www.organicsaffron.co.nz/>
- ⁸⁸ Price of 6 grams of organic French saffron threads as of May 11, 2009 from Safran du Gatinais, <http://www.safrandugatinais.fr/en/safranboites.htm>
- ⁸⁹ Price of ¼ oz of organic Spanish saffron threads as of May 11, 2009 from Starwest Botanicals, http://www.starwest-botanicals.com/product/4-saffron.html?utm_source=froogle&utm_medium=feed#tabs
- ⁹⁰ Wyeth and Malik, "A Strategy for Promoting Afghan Saffron Exports," 11; MRRD/NABPD/UNDP, "Success Story: Saffron Enterprise-Hirat Province."
- ⁹¹ ICARDA, *Annual Report 2005, 2006*, 72-73, <http://www.icarda.org/Publications/AnnualReport/2005/PDF/FullReport.pdf>
- ⁹² DACAAR, *Annual Report 2005*, 15, http://www.dacaar.org/upload/Source/PDf/annual_report_dacaar_2005.pdf, (accessed April 30, 2009); Altai Consulting, "Market Sector Assessments: SME Development," March 2005, Prepared for UNDP, Kabul, 63, http://undp.org.af/Publications/KeyDocuments/Final_Report_MSA_SME_Altai_Cons_July_14th_2005.pdf (accessed April 30, 2009).
- ⁹³ DACAAR, Presentation given at the 3rd National Conference on Afghanistan's Saffron; Catholic Relief Services, "CRS Saffron Activities in Herat Province," Presentation given at the 3rd National Conference on Afghanistan's Saffron, November 12-13, 2008.
- ⁹⁴ Wyeth and Malik, "A Strategy for Promoting Afghan Saffron Exports," 13.
- ⁹⁵ *Ibid.*, 14.
- ⁹⁶ Afropol Fine Foods, *Saffron*, <http://www.afropol.com/products/saffron.asp#cla> (accessed April 27, 2009)
- ⁹⁷ Tarvand Saffron Co., "Grading & Classification," <http://www.tarvandsaffron.com/classification.htm> (accessed May 13, 2009)
- ⁹⁸ Wyeth and Malik, "A Strategy for Promoting Afghan Saffron Exports," 20.
- ⁹⁹ *Ibid.*, 20-22.
- ¹⁰⁰ TransFair USA, <http://www.transfairusa.org/content/about/overview.php> (accessed May 5, 2009)
- ¹⁰¹ *Ibid.*
- ¹⁰² Wyeth and Malik, "A Strategy for Promoting Afghan Saffron Exports," 20-22.
- ¹⁰³ *Ibid.*, 22-23.
- ¹⁰⁴ New Zealand Institute for Crop & Food Research Institute, 1993, as referenced in Altai Consulting, "Market Sector Assessments: SME Development," March 2005, Prepared for UNDP, Kabul, 58, http://undp.org.af/Publications/KeyDocuments/Final_Report_MSA_SME_Altai_Cons_July_14th_2005.pdf (accessed April 30, 2009)
- ¹⁰⁵ Altai Consulting interviews with Iranian processors as referenced in Altai Consulting, "Market Sector Assessments: SME Development," March 2005, Prepared for UNDP, Kabul, 58, http://undp.org.af/Publications/KeyDocuments/Final_Report_MSA_SME_Altai_Cons_July_14th_2005.pdf (accessed April 30, 2009)
- ¹⁰⁶ Wyeth and Malik, "A Strategy for Promoting Afghan Saffron Exports," 25-26.
- ¹⁰⁷ *Ibid.*, 26-29.
- ¹⁰⁸ *Ibid.*, 26-27.
- ¹⁰⁹ Ali Gohar and Peter Wyeth, *Saffron Production and Farmer Perceptions in Pashtun Zarghun District of Herat*, November 2006, 1, http://www.icarda.org/Ralfweb/SSLPWF/M-E/Saffron_prodn_in_Herat-AG-PW-Nov06.pdf
- ¹¹⁰ *Ibid.*, 11.
- ¹¹¹ Giri et al. "Saffron Productivity and Weather."
- ¹¹² Creating Hope International, "Afghan Recipe Corner," <http://www.creatinghope.org/afghanrecipecorner> (accessed May 19, 2009).