

Saffron Production and Farmer Perceptions in Pashtun Zarghun District of Herat¹

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Based on Interviews by DACAAR Field Staff
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RALF Website: www.icarda.cgiar.org/RALFweb/RALF.htm

1. Introduction

This report, which focuses on saffron production and farmer perceptions is part of a larger study that will also include consideration of marketing. Study of the farm economics of saffron is one of the four outputs of **RALF* (Research in Alternative Livelihoods Fund)** Project 02-02. To understand the socio-economic viability of saffron, it is important to have an adequate knowledge of the farm economics, existing farming practices and the criteria the farmers use in making crop choices. Selection of a particular crop does not depend merely on market price or on the ecological potential. Crops are selected on the basis of an array of competing interests arising from market demand, vested interests of landlords and farmers, geo-climatic potential, availability of farm inputs and purchasing power, subsistence and domestic needs (including fuel and fodder for livestock), availability of irrigation water, farm labor, etc. Therefore the research on saffron followed a systems approach that included consideration of farm and household characteristics, farmer perceptions regarding saffron production, a quantitative assessment of production costs and returns, and an exploration of market potential. This report deals with all of these aspects except market potential, which a later report will cover.

No single licit crop is likely to be as profitable as poppy. Thus the aim of the project was not to introduce saffron as an economic rival to poppy but simply to assess its profitability and potential as an income earner for farmers in Pashtun Zarghun District where water is quite scarce for many farmers. Saffron makes only modest demands on water, so the alternatives are fewer here than in other areas where water is more plentiful. Saffron is a good candidate for raising the productivity of land as a legitimate high value crop and offering a new livelihood opportunity for farmers in Pashtun Zarghun who are already interested, because of government policy or religious reasons, in an alternative to poppy cultivation.

This study concludes that here, and similar agro-ecological zones in Afghanistan: (i) the quality and quantity of saffron is potentially high; (iii) saffron will generate farm employment during the slack season and will contribute to the overall effort to alleviate poverty; (iv) as a high value crop saffron will facilitate access of sharecroppers to land; (v) the risks associated with saffron production are not particularly high; (vi) saffron production and processing offer opportunities for employment and income for women.

On the other hand, there are also points that need attention. Market links are left to the later report but no analysis is needed to know it takes high quality saffron to earn the best prices. The evidence here suggests that farmers have only vague notions of what defines quality, or what production, harvesting and processing practices yield the best quality. Nor are they clear about how to optimize production per jerib of land. The best prices for any crop are obtained when it is organically produced. At the moment production recommendations call for application of chemical fertilizers. In principle, switching to green and animal manure

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² DACAAR (Danish Committee for Aid to Afghan Refugees) and WSU (Washington State University) respectively.

would not be difficult, but current sources of both may be inadequate and the best methods of increasing supplies must be identified and extended to farmers. Finally, and importantly, saffron cultivation is likely to encourage child labor and the producer associations must take steps to discourage it where it threatens overwork or staying away from school.

1.1. The current status of saffron production in Herat Province

Saffron production in Herat Province has not been going on for long. Under RALF 2 the following progress has been made as of November 2006:

- DACAAR has worked with farmers in Pashtun Zarghun District to establish three producers' associations covering some 250 farmers, and more farmers are interested. DACAAR has distributed to farmers 16,000 kg of high quality corms that it bought from the Dutch saffron company, 'Growing Sales Exchange (GSE). This is enough to plant 16 jeribs (5.25 ha.)
- Washington State University (WSU) has conducted research on the market potential for Afghan saffron, and the outlook for demand for Afghan saffron is promising if market links are carefully developed.
- GSE (see above) has procured around €500,000 from the Dutch government to promote saffron production and marketing in Afghanistan. It has assessed the potential and has opened an office in Herat. It will help raise the production and processing skills of saffron growers and create linkages with export markets. So far its farmers have five hectares under saffron and it plans to add another six in 2007.
- DACAAR and WSU have made estimates of saffron production costs and income that show that the crop is highly profitable.
- A DACAAR staff member has visited Iran and the Netherlands to learn more about production and marketing. Good personal relations exist with persons connected with saffron production in Iran, but future collaboration is limited by the fact that Iranian law forbids assistance to other countries in saffron production and marketing.

In addition to these efforts under RALF 2 there are other aspects to saffron development in Herat Province. First, farmers in Ghoryan District have been producing saffron for some years. The original impetus there came from the experience some of them gained as refugees living in Iran. Second, Catholic Relief Services has been working for two years with saffron growers, including women producers, to promote saffron production and marketing. Third, World Vision distributed corm to about 20 farmers in Badghis in 2004. World Vision is also experimenting in its own nursery (not farmers' fields) with an Italian technique to produce saffron on an annual cycle, sowing the corms (bulbs), harvesting saffron and digging up the corms all in the same year (shortening the time farmers have to wait before getting a saleable crop.)

1.2. Methodology and the structure of this report

To collect information on different socio-economic aspects of saffron cultivation a number of stakeholders and informants were interviewed: DACAAR staff and the staff of other NGOs engaged in promoting saffron, government officials, researchers, specialists from GSE, and, most crucially, saffron growers, both those in Pashtun Zarghun who have only recently begun to cultivate the crop and those in Ghoryan District who have been producing it for some years. The quantitative information in Section 3 is taken from a survey of 46 individuals in Pashtun-Zarghun undertaken in the second half of 2005.

In the rest of the paper, Section 2 offers information about resources available to farmers and other socioeconomic dimensions of farming in the project area; Section 3 is about saffron production and farmer perceptions regarding it; Section 4 describes DACAAR recommendations for growing saffron, reports on costs and returns in saffron production and recounts the views of GSE specialists regarding saffron potential in Herat Province and what

should be done to realize it. Section 5 presents the report's key conclusions.

2. Farm and Household Characteristics

The following data are from the interviews of the group of 46 individuals, of whom 19 were women. In some cases there were two people from the same household. This fact was not noted in the questionnaires, so which ones these were had to be inferred from the data, assuming that when answers from two individuals matched one another closely, especially for quantitative data (jeribs owned, etc.), the respondents were from the same household. In all cases but two, the resulting matched pairs were made up of one man and one woman, presumably wife and husband. When discussing quantitative information (size of holdings, areas of saffron cultivated, etc.) data from one of each of these pairs were not counted. (The one not counted was the one that mentioned fewer crops currently grown, on the assumption that the information on this point was less complete.) One additional person (male) is not included when considering quantitative data because he provided none. When he and one each of the matched pairs are excluded 31 individuals remain, nine of them women.

Some issues remain with the data. For example, all interviewees were supposed to be engaged in agriculture and all say that their livelihoods depend at least partly on it, yet three say they do not either own or cultivate any land. Second, the measurements in jeribs of land area have an inherent difficulty in that farm plots are irregularly shaped and their areas difficult to measure accurately. Third, data given on land areas are to be taken as approximations, as plots of land are not regularly shaped and are difficult to measure. Finally, as the sample was not statistically random, there is a limit to the level of analysis to which the data should be subjected. On the other hand, the sample was purposively selected to be representative, it covers a wide range of respondents in terms of land holdings and family size, and nearly all of the information collected makes sense. Overall, while the figures quoted here cannot be taken as precise estimates they are probably broadly indicative or illustrative of saffron production and farmer perceptions.

The main findings are as follows:

Land owned and cultivated: There are 3 systems of land tenancy in Pashtun Zarghun:

- a. **Landownership:** The owners farm themselves and hire additional labor when needed.
- b. **Sharecropping:** Landowners hand over a portion of their land to smallholders or landless farmers to grow crops and take a portion of harvest. Commonly they pay the same share of cash costs for inputs such as fertilizer, seed and pesticide that they take of the sharecropper's harvest.
- c. **Leasing or renting:** In this system the landowners rents out a portion or whole of his/her land for cash or kind. Some landowners provide credit or other inputs to the farmer, which they return at the time of harvest or later.

Access by poor farmers to land has remained a major concern in Afghanistan and the distribution of land is very unequal, varying from 4 jeribs to 500. The median³ area of land owned (including the landless) was 12 jeribs. The largest landowners do not cultivate all their land, either because of lack of water (see below), lack of labor, because some of the land is poor quality, or because they like to leave some land fallow so as to recover its fertility. The landowner with 150 jeribs cultivated 100 and the one with 500 jeribs only 15. The median amount of land cultivated was 10 jeribs.

Five interviewees said that they rented land out. Sharecropping arrangements are more

³ The median (the mid-point of a range of numbers) is used instead of the mean because it is not distorted by extreme values. In Table 1, because a very few farmers own a large number of jeribs, the mean would be 40 jeribs, which is much larger than the amount of land owned by a typical farmer in Pashtun Zarghun.

common. In this group, 10 farmers sharecropped out from 5 to 40 jeribs each and 6 farmers sharecropped in from 4 to 20 jeribs each. Most owners who sharecrop land out also provide a portion of the inputs needed, such as seed, fertilizer and pesticides. There is no fixed rule on these matters, but the following are common:

- Owner bears 50% cost of seed, fertilizer and pesticide and takes 50% of the harvest.
- Owner takes 40% of the harvest and bears some portion (not always 40%) of seed, fertilizer and pesticide, or credit.

Water: In Herat Province water is the main limiting factor in making crop choices. As elsewhere in Afghanistan, each farmer is allocated a certain amount of water in terms of hours of flow. In this survey farmers were asked to say how many jeribs their allocation of water could irrigate, and Table 1 shows there is a close, though not perfect, correlation between the total number of jeribs cultivated and the number for which water was adequate. (“Other” in this and other tables refers to incomplete or uncertain data.)

Table 1 Land cultivated and water sufficiency

Total cultivated (jeribs)	Water availability (jeribs)								Total
	0	1-5	6-10	11-20	21-50	51-100	>100	Other	
0			2	1					3
1-5		4						1	5
6-10			3	5					8
11-20				2	2			1	5
21-50					1	5			6
51-100							2		2
>100									0
Other								2	2
Total	0	7	9	4	5	2	0	4	31

Cropping patterns and the impact of drought: Table 2 shows the crops grown by farms. (Note that only four farmers in this table say they grow saffron. In a later table 28 farmers report the areas of saffron they grow. At least part of the explanation may be that all the saffron in this district is recently planted and so not producing much if any spice.) All families reported growing wheat. Common vegetables are tomatoes, okra, garlic, melons, and coriander. Fruits include grapes and apricots.

Table 2. Current crops grown (numbers of farmers reporting)

Wheat	Barley	Peas	Coriander	Vegetable	Vetch	Rice	Mung bean	Clover	Saffron	Sesame	Garlic	Talkhak	Cotton	Melon	Fruit/grape
31	22	12	10	11	10	7	7	6	3	4	2	2	1	4	2

When asked about changes in cropping patterns over the last five years and their causes, seven mentioned drought, 7 said more rice and cotton used to be grown. Both of these crops had given way to others less demanding of water, including wheat and saffron.

Criteria for making crop choices: As already mentioned, water is a crucial factor in decisions regarding which crops to grow, and 18 out of the 31 households mentioned it or drought as an important criterion affecting their decisions.

Table 3. Decision makers for crops grown (numbers of families reporting)

Sharecropper or tenant	Landowner	Both	Depends	Don't know	TOTAL
17	8	4	2	1	28

Twenty-one farmers, of all sizes, cited family or animal consumption needs as important, illustrating the fact that crops are, in the first instance, for use at home. (The 13 others were also spread among all sizes of farmers.) Even the farmer who said he cultivated 100 jeribs said that family needs were important in deciding which crops to grow. Only one farmer mentioned labor as a factor, perhaps because all the others had plenty and did not have to worry about it. Table 3 shows that sharecroppers or tenants are most commonly the decision-makers, though in 8 cases the landowners decided.

Family size and dependents: Families are commonly large. In this sample there were 8 families with 15 or more members. The median family size was 11 members. In contrast, the median number of working members was only 2, and 10 households said there was only one working member. No direct questions were asked about child labor, but these figures suggest that children are not seen, at least primarily, as workers.

Marketing farm products and other livelihoods: Sixteen families said that their only livelihood was from growing crops alone. Table 4 shows the other sources of livelihood. Two farmers mentioned two sources (tailoring and labor and tailoring and livestock), taking the total from 31 to 33.

Table 4. Main sources of family livelihoods in addition to agriculture (numbers of families reporting)

Crops alone	Labor	Teach	Tailoring	Handicrafts	Livestock	Iron working	Electrical	TOTAL
16	5	1	3	1	5	1	1	31

In this sample from Pashtun Zarghun, most farmers sell some of whatever it is they produce. Only two farmers said they did not sell anything. For the rest, what they sell could be true surpluses, i.e. amounts beyond annual family consumption needs, or seasonal surpluses sold to meet immediate cash needs and needing to be bought back later for food, probably at higher prices.

When asked about market prices, 8 farmers complained about low prices for products they sold and 6 about high prices for products they had to buy, the answer presumably depending on whether the family was predominantly selling surpluses or buying to make up deficits in home production.

3. Saffron Production and Farmer Perceptions

Saffron in Herat: Saffron first came to Herat Province in Ghoryan District, where farmers came who had learned how to produce it while refugees in Iran. Those farmers acquired corm and started production on their own initiative. As mentioned in the introduction, NGOs have also promoted it.

Table 5. Areas planted to saffron (square meters)

Total cultivated (jeribs)	Saffron cultivated (sq m)								Total
	0	1-250	251-500	501-1,000	1,001-1,999	2,000	4,000	Other	
0	1		2						3
1-5	1		2	1		1			5
6-10	4	1	1	2					8
11-20	2	1	1					1	5
21-50			2	1	1		2		6
51-100	1					1			2
>100									0
Other								2	2
Total	9	2	8	4	1	2	2	3	31

Table 5 shows 19 farmers growing saffron a total of 19,743 square meters (10 jeribs) at the time of the interviews. The smallest area was 220 square meters, the largest two jeribs and the median 330 square meters. There is a clear positive correlation between total area cultivated by the farmers and the areas of saffron they planted. These figures correct a common impression that only large farmers want to take the risk of growing new crops such as saffron, or can wait two or more years before a crop reaches full production. Ten of the 19 farmers shown in Table 5 as growing saffron cultivated a total ten or fewer jeribs, the median total area cultivated. Furthermore, 11 of the 29 saffron farmers, 69% of them, relied on growing crops alone for their livelihood, a higher proportion than the 49% for the whole sample.

Knowledge regarding saffron among farmers: The following paragraphs show attitudes rather than quantitative information, which was one of the main points of the survey. The data are drawn from the whole sample of 46 individuals. As some of these are married, family discussions must play a role and not all attitudes independently formed. However, it was decided that it would be better to show results for all 46 households than take it as given that all spouses would necessarily have the same attitudes.

It is worth noting that in all the following tables farmers who grow saffron are much less likely to answer “Don’t know” to the questions put to them about saffron. The interpretation is that, as would be hoped, farmers who grow saffron believe they are better informed about the crop than farmers who do not.

Reasons for choosing to plant saffron.

1. Saffron growers were more likely than others to see this crop as more profitable than any legitimate alternative (the question specifically excluded poppy), though, interestingly, four saffron farmers and no others mentioned rice as being more profitable. We do not have information on the costs and revenues of growing rice to assess the validity of this view.

Table 6.1. Other crops more profitable than saffron

	None	Rice	Other	Don't know	Total
Saffron growers	17	4	2	6	29
Other farmers	2	0	0	15	17

2. Saffron growers regard their crop as using less water than other common crops, as easier to grow, and as using fewer inputs such as fertilizer. These advantages were seen as applying to both landowners and tenants or sharecroppers. On the other hand, four saffron growers noted the disadvantage to the latter group of having to wait for a return on investment. (This would presumably also be a disadvantage to landowners sharecropping out.)

Table 6.2. Advantages and disadvantage of saffron compared to other crops

	Don't know	Less water	Less difficult to grow	Income, price, benefit, money, market	Lesser input amounts	Long wait, prefer cumin/wheat	Other	Total
Saffron growers								
Landowners	2	14	5	7	7			35
Sharecroppers, tenants	3	1	5	8	2	6	4	29
Other farmers								
Landowners	8	4	6	2	0	0	0	20
Sharecroppers, tenants	14	1	1	0	0	0	1	17

Farmers were right about saffron's water needs not needing as great as most other crops. In particular, saffron is dormant during late spring and summer when other crops are most in need of it. They were not asked why they thought saffron was easier to grow but, again, it is most demanding of labor late in the year when demands are otherwise slack. They were also correct in their perception that saffron needs fewer inputs such as fertilizer. It does need both urea and DAP in the first year, but only urea thereafter, and as the flower is not notably susceptible to insects and disease in the dry conditions prevailing in Herat Province (though see below on other pests), chemical pesticides are not applied.

Risks and credit availability for saffron growers

- Specific risks and difficulties were more apparent to saffron growers than they are to other farmers. The most commonly mentioned issues concerned fluctuations in demand or prices for saffron. Next came availability of good corm and losses due to mice eating corm in the fields. Some farmers also mentioned bees, though for what reason is not clear. (Bees are not needed for pollination, as the flower is sterile.) A few farmers also mentioned availability of water and care needed in processing (drying, keeping product clean).

Table 6.3. Risks and difficulties attached to saffron growing

	No problem	Market	Corm	Mice	Bees	Water	Process	Other	Don't know
Saffron growers	4	10	6	6	5	4	4	5	2
Other	0	0	2	0	0	0	0	5	12

- Credit based on saffron is seen as not likely to be available. To what extent this view was based on practical experience was not specifically noted, but it was much more common among saffron growers than others, and if accurate it is a significant drawback. Perhaps the situation will change after credit givers have had more time to see saffron production as a profitable venture.

Table 6.4. Credit availability for saffron growers

	Yes	No	Other	Don't know	Total
Saffron growers	8	20	1	0	29
Other farmers	7	8	0	2	17

Markets and perceptions of quality

- At the time of the interviews farmers had not had much saffron to sell, but nearly all knew that there were shopkeepers or traders willing to buy. Among other farmers less than half were aware of this fact.

Table 6.5. Expected purchasers of saffron

	Traders, shops	Don't know	Total
Saffron growers	26	3	29
Other farmers	7	10	17

6. Although saffron farmers were more aware than others of the characteristics that determine the quality of saffron they are still hazy on the subject. In fact, color, smell and cleanliness are all important (and if all farmers had mentioned all three the total for that line should have been $29 \times 3 = 57$). No doubt they will learn in time, but they would earn more from their production if they knew it now, and – just as importantly – also knew how to produce saffron that has those characteristics.

Table 6.6. Perceptions of quality characteristics

	Color	Smell	Clean	Don't know	Total
Saffron growers	20	6	6	6	38
Other farmers	2	0	3	12	17

Perceptions of social impact

Saffron growers were clearer than others in having a positive view of the likely social impact of saffron production (Table 6.5).

Table 6.7 Perceptions of social impact

Social impact	Positive	Neutral	Don't know	Total
Saffron growers	27	1	1	29
Other farmers	3	2	12	17
Benefits to all versus the rich	All	Rich	Don't know	Total
Saffron growers	21	7	1	29
Other farmers	1	8	8	17
Reduce poverty	Yes		Don't know	Total
Saffron growers	28		1	29
Other farmers	12	0	5	17
Role of women	Collect, clean, dry		Don't know	Total
Saffron growers	28		1	29
Other farmers	7	0	10	17
Empower women	Yes	As men	Don't know	Total
Saffron growers	26	3	0	29
Other farmers	8	1	8	17

Expectations were predominantly that:

- The overall impact on social relations (e.g. within families, between neighbors, between landowners and sharecroppers) would be positive.
- Everyone would benefit economically from producing saffron and poverty would be reduced. A few, among both saffron growers and others, thought that the gains would go more to the rich and landowners than to sharecroppers and tenants. This is correct in the sense that, as Table 5 showed, larger farmers planted more saffron. It is also quite possible that some very small farmers with no off-farm income will not be able to grow saffron because they cannot afford to wait a year or more before they start earning significant income from their investment.

On the other hand, Table 5 also shows that some quite small farmers have already planted saffron. Furthermore, the fact that saffron requires only modest amounts of

water means that farmers not well endowed with access to water and who could not produce crops that are more water demanding would be able to produce it. Finally, for the landless and very small landowners who hire out their labor, their opportunities for employment may go up when large saffron farmers without large families take on paid workers.

9. Women would be employed in collecting flowers from the field and drying the saffron and respondents judged that women's status would benefit as a result. (Some also answered that women could clean saffron, but while keeping the saffron clean is essential, cleaning it after it becomes contaminated with dust is not feasible.)

This perception that saffron production will increase employment for women may strengthen as people in the area become more familiar with saffron. In Ghoryan, where farmers have been producing saffron for some years, women plant the corms, collect flowers and transport them home where they separate the stigmas (the spice), from the flowers and the styles (which are attached to the lower part of the stigmas) and dry and pack the saffron. How much women are involved in planting corms and collecting flowers may depend for some farmers on how far the fields are from the home and how visible the workers are from the road, but the really time consuming work is separating the stigmas from the flowers and the styles, which is done at home. Drying takes about 10 days and women also look after that.

A possible downside is children can also perform much of the work in saffron production, and education and vigilance will be needed to discourage child labor where it would result in overwork or take the children out of school.

Perceptions of poppy production

At present the Pashtun Zarghun farmers do not cultivate poppy. Besides being banned by the government, religious leaders and elders in the community have played a proactive and effective role in restraining the farmers from cultivating it. In the sample of 46 farmers all condemned it and most mentioned that growing it was against Islam. The motivation for growing it was economic, and they cited poverty and drought as important factors. To combat it they thought government and religious condemnation was important, and some mentioned that this should be accompanied by assistance to grow other crops. According to the members of saffron association, some farmers had started poppy cultivation during Taliban regime but found that the cost of production was high and women could not work in poppy fields because harvesting needed highly skilled workers.

4. Production practices, profitability and what is needed to realize potential.

4.1. DACAAR recommendations for production practices

The following are DACAAR recommendations regarding planting and harvesting saffron.

Planting

Corms are planted at rate of 400 kg per jerib in rows of either 30 x 20 or 25 x 25cm spacing at a depth of 15 to 20 cm. It is customary in Afghanistan to put three to four corms in every hole, but this is because the quality of corm is commonly low. Farmers do not at present distinguish good corms (at least six to eight grams each) from poor corms (less than that weight). Maximum production is attained in the second or third year. To attain higher yields earlier the rate of corms per jerib can be increased to 700kg, but some corms must be removed after four years and sold or planted elsewhere to avoid overcrowding.

Fertilizing

Recommendations are to apply 20 kg of urea and 50 kg of DAP in the first year and 20 kg of urea thereafter. Fertilizing is essential but recommendations will have to change if saffron

production is to be organic. Farmers are accustomed to using manure, especially animal manure, but it is unlikely that many will have enough of the latter to fully substitute for the chemical manure, and they will need instruction in how best to increase quantities of green manure. (Many farmers in Afghanistan use night soil as fertilizer. However, for a crop such as saffron that is destined to Europe and the US where perceptions regarding night soil are negative, this would probably not be wise.)

Irrigation

Frequency of irrigation and amount of fertilizer depend on rain fall and land quality. If there has been little rain and moisture has not reached the corms, irrigation is first needed in early to mid-October. This will break corm dormancy and induce plant growth and healthy flowers. There should be no irrigation during the flowering season in late October and November. The second irrigation is just after harvesting the flowers and the third irrigation is in March.

Harvesting

Flowering generally occurs 20-25 days after the first irrigation. Flowers appear over a period of about a month and by mid December the harvest is over. Flowers should be picked as soon as they open and between sunrise and 9 am, after which strong sunlight lowers saffron quality. The flowers are loosely packed in baskets and taken home. Stigmas should be taken from the flowers and separated from the styles within 24 hours. Natural drying takes 8 to 12 days and should be done on clean paper or cloth in the shade because saffron will bleach if left in direct sunlight for long. Equipment that can dry saffron in minutes at optimum temperatures can be purchased. Currently they are not available in Afghanistan, though it is intended that they will be.

Saffron yield

There are three stigmas per flower and it takes some 150,000 flowers (weighing roughly 70 kg) to produce 1kg saffron. One jerib of land yields around 2 kg of saffron when at maximum productivity. In the first year there is little saffron and maximum yield is typically in years 2, 3 and 4. The corms also reproduce and grow in number, the newer ones growing above the older ones. The corms nearer the surface of the soil are less productive and after four or five years begin to yield fewer flowers. After productivity has declined considerably, all the corms should be dug up and production begun again in another field. In Afghanistan, where labor for digging up corms and replanting is relatively cheap, this can be after five years. In Europe, where labor is more expensive, it can be after seven years.

Productivity per jerib depends on the size of corms planted, as small corms may not produce any flowers while the largest can produce up to 12. Larger corms also produce larger numbers of new corms, and corms of replanting quality have considerable value in themselves. Farmers interested in earning income from corms earlier on can begin to harvest some of them after four years. Small corms of less than six or eight grams have value as animal feed. The leaves of the crocus plant, which grow after its flowering stage and can amount to 150 dry kg per jerib, are also good animal fodder.

4.2. Costs and returns in saffron production

Estimating costs and returns for any agricultural product is a somewhat artificial exercise but it is both common and useful. Estimates are artificial partly because it is difficult to get reliable responses from farmers regarding costs, particularly labor costs which are generally the most important. First, it is not easy to remember accurately how much time is spent in the field on each task. Second, when family members are involved – which is most of the time – they come to the fields and leave irregularly and vary hugely what they accomplish in any given amount of time. Estimates are also artificial because they cannot take account of considerable variations between farmers in the production practices they follow.

At the same time, estimating costs and returns is both common and useful because, at a minimum, it identifies the inputs farmers have to buy, the tasks that they have to carry out

and the items that bring in revenue. In addition, when properly done, the approximate magnitudes of all these components are assessed, allowing comparisons of profitability to be made among different crops. The difficulties mentioned mean that narrow differences among crops should be disregarded, but large differences are worth knowing about from the point of view of farmers as well as researchers.

Table 7 shows estimates for four different crops and poppy, based on interviews of farmers in Pashtun Zarghun. The fact that saffron is a perennial crop makes it necessary to look at net present values rather than profits per year (strictly, returns over variable costs⁴) and it is these that Table 7 presents.⁵ The figures are preliminary because time and resources made it possible to contact only a small number of farmers. Also, in the case of saffron, farmers have not been growing the crop for long and are not as familiar with the time taken to conduct various tasks as they will be after gaining more experience.

Table 7. Net Present Values (NPVs) five years production, Herat Province

	Total NPVs (afghanis)				NPVs per day (afghanis)			
	10%	15%	20%	25%	10%	15%	20%	25%
Saffron	156,613	123,662	98,122	78,118	289	229	181	144
Wheat	31,445	27,806	24,807	22,308	286	253	226	203
Chick peas	10,614	9,386	8,374	7,530	133	117	105	94
Onions	33,454	29,583	26,392	23,733	134	118	106	95
Poppy	179,153	158,423	141,336	127,095	389	344	307	276
Wheat + clover	70,397	62,409	55,816	50,314	313	277	248	224
Chick peas + clover	49,567	43,989	39,383	35,536	254	226	202	182
Onions + clover	72,406	64,186	57,401	51,739	198	176	157	142
Poppy + clover	218,105	193,026	172,345	155,101	379	336	300	270

Source: Saffron, calculations by DACAAR and Washington State University. Other crops DACAAR. Complete tables are in an appendix to this report.

The figures show that saffron is clearly more profitable than wheat, chick peas and onions. The difference diminishes as the discount rate increases, but even at 25% saffron is over three times more profitable than any of the others except for poppy. The advantage saffron has is less when compared with a situation where it is possible to grow two crops per year,

⁴ Variable costs are essentially annual operating expenses, including labor. They do not include fixed costs such as depreciation and the cost of land (crop shares or rent paid to landowners), which would be paid out of returns over variable costs.

⁵ Perennial crops take more than a year to reach their full potential. In the early years farmers incur the costs of establishment without getting much if any output to sell, while in later years annual costs typically decline while income from production is high. Taking the average of annual costs and revenues might sound like a solution but it isn't because, to a farmer (and anyone else) 100 Afs received or paid this year is worth more than 100 Afs received or paid next year. This is the same logic that lies behind the thought that a poor farmers may find it difficult to invest in saffron because their families are not well placed to wait two years for a return on their investment. They would much prefer food or income sooner rather than later. Similarly, costs incurred in earlier years weigh more heavily than those incurred further in the future. For perennial crops this weighting of income and costs more heavily for earlier rather than later years is achieved by reducing, or discounting them by a certain percentage every year. The discounted costs and revenues can then be added up across years and so can the discounted revenues. The difference between the two is called the Net Present Value. There is no clear rule for settling on one discount rate rather than another. In fact, because rich farmers' needs are typically less urgent than those of poor farmers, the discount rate applicable to the rich is, in principle, lower than that applicable to the poor. For this reason it is customary to calculate the net present value at more than one rate to see if different rates change the overall conclusions regarding profitability.

here illustrated with clover as the second one. However, as it is possible to grow saffron where there is only enough water for one crop a year, the comparison with a single crop will often be the relevant one.

Unfortunately, these figures show growing poppy to be more than 50% more profitable than producing saffron. 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 became 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. Discouragement by government, religious and community leaders is also needed.

4.3. GSE assessment of potential

After a visit to Herat in 2005 Dutch specialists from GSE listed a number of findings, of which the following are the most important.

- The region is well suited to saffron production, but if it is to reach its potential as a source of income for local farmers a number of improvements will be necessary.
- The current stock of corms is of poor quality and should not be used further. It should be completely replaced with improved stock.
- Soil fertility will have to be raised.
- Water quality is already good and the amount available adequate.
- Stigmas are too short and too often remain attached to styles.
- There is dust and sand in the saffron which is unacceptable.
- Harvesting and separating stigmas from styles will have to be improved to increase saffron quality.
- Currently, saffron is crumbly and too dry which indicates that the drying process has probably been either too long or under conditions that are too hot. It will have to be properly controlled.
- To attract traders and brokers sufficient quantity and regular supply needs to be ensured.
- Because saffron production is new in Afghanistan, there is a good opportunity to establish organic production and a reputation for high quality.

5. Key Findings

The following are key points from the foregoing discussion:

1. Saffron could make a substantial contribution to improving incomes among farmers in Herat Province. Poppy is not grown, so replacing it is not an issue but lack of legitimate cash crops is. At the moment farmers grow subsistence crops and if they sell anything it is the surpluses they have over domestic needs. In the sample of farmers analyzed here over half the farmers depended for their livelihoods on growing crops alone.
2. Scarcity of both land and water limits agricultural production in this part of Afghanistan. There is a big gap between the rich and poor in terms of access to both, but farmers across the spectrum have already begun to grow saffron.
3. Most farmers who grow saffron view it as the most profitable among licit cash crops. It is also seen as using less in the way of inputs including fertilizer, less competitive for water because of the timing and amount needed, and relatively easy to grow.

Some farmers see the need to wait for a good return as an important drawback.

4. Women are heavily involved in production, especially in saffron harvesting and processing. This contribution to cash earnings is seen as having a positive impact on their status. At the same time, children can also be productive at the harvesting and processing stage. This could do great harm if they are overworked or they taken out of school to do the work, and education and vigilance will be needed to avoid these problems.
5. The risks or difficulties associated with saffron are market uncertainties, pests (mice and bees), inadequate water, and difficulties arising in processing. With the exception of market uncertainties farmers can eliminate or reduce these.
6. Farmers who already grow saffron are better informed about it than those who do not. This is all to the good, but it would be better if all farmers were well informed about both production and marketing so that those who do not produce it will have made their decisions on the basis of positive reasons rather than lack of knowledge.
7. Currently farmers apply chemical fertilizers to raise fertility. This is a good practice but organic saffron is likely to fetch higher prices and if they are to switch to using green manure and animal manure farmers will need additional training.
8. All farmers could benefit from more training, to raise the quantities they produce per jerib as well as the quality of their produce. Training needs will be greater if organic production of saffron is to be encouraged. Farmers in Afghanistan do not use pesticides when producing saffron, but they do use chemical fertilizers, which they will have to replace with green or animal manure.

In sum, the prospects for saffron are good and farmers are ready for it. The associations already formed by DACAAR to train farmers provide a good basis for continuing the promotional work and provide the first link between them and world markets.

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