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Mercy Corps International (MCI)
Development Alternatives Inc. (DAI)

Joint

# Apricot Drying Training Program

Consultancy Report

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## Executive Summary

The objective of this consultancy assignment was to give practical training to two separate groups of trainees in drying and packaging apricots for market. This involved the total process from picking to the transport up to the processing site, grading, cutting, Sulphuring, drying and packaging of apricots.

In addition it was aimed at giving the trainees as much information as possible in the general culture and production of the apricot fruit. About one week was allowed for each group of trainees.

The first group of trainees which consisted of 23 men from the various apricot growing districts of Afghanistan had been through such a course last year. These people had to be given a refresher course in addition to evaluating their previous years performance. This course was taught by this consultant alone.

The second group of trainees was 40 men who were entirely new to the technology. In this course the processing and drying of the fruit was handled by Dr. Michael Tsamperlis, a professor in the University of Athens and employed by High Value Horticulture Inc (HVH) of England under a contract with Development Alternatives Inc. (DAI) who are implementing an agricultural project under agreement with USAID. The general culture and production of apricots was handled by this consultant. While the first group of trainees was from DAI and MCI (Mercy Corps International). The second group included trainees from several NGOs such as IRC, DACCAR, ARC, ARO, ARR, ISRA, FAO, RIFRA and SCF in addition to DAI and MCI.

Afghanistan has ideal conditions for the production of very high quality apricots and good markets both locally and abroad are available for this product in fresh but specially dried from. However the production of this crop is limited and income from it relatively low. This is due to lack of necessary knowledge about efficient culture of the crop on the part of the producers and lack of good quality and packaging for markets. The one important constraint in quality is insect and disease damage to the fruit which the farmers are unable to control. The second is the very low quality of the dried product due to lack of knowledge about modern technology to be applied in the process.

Therefore emphasis was placed on the following aspects of the industry in the duration of the course:

### I. Drying and Packaging

Since the first crop of apricots was available on the market and the first job of the trainees was to catch the harvest in their areas in Afghanistan, priority was given to the practical aspects of the drying process. In this field following topics were covered in detail.

a) Testing of Sulphur from different sources available on the local markets. Four different Sulphurs were burned in the presence of the trainees for comparison. This gave them an idea of the fact that all Sulphurs are not exactly similar in their burning quality. Adding Sodium nitrate ($NaNO_3$) to improve burning was demonstrated.

b) **Sulphuring chambers**

Three different size chambers were constructed. Two of them permanent rooms made of local materials and with local craftsmanship. The third chamber was made by erecting a small frame of wooden poles which was covered by a poly ethylene sheet. Sand was put on the edges of the sheet which lay on the ground to make it air tight.

c) **Tray design**

Trays are probably the biggest item of expense in the process of drying. Wooden trays using locally available lumber were made for the purpose of this course. These are fairly expensive. Several other options were tried including a netted plastic material to be used for the bottom of the tray to save lumber. Various basket type designs were tried by MCI last year. Smaller trays were made of lumber by MCI also. The most economical were the ones made by MCI using wood. The others were not completely satisfactory. Work will continue by all concerned to find cheaper material for tray manufacture.

d) **Grading**

Importance of grading the fruit was demonstrated. It was found that grading by eye is not entirely satisfactory especially if more than one person are doing it. It will be very useful if low cost locally made grading equipment were made for grading the fruit. This should be rather easy to do and in addition to saving labour will make the grading much more uniform.

<u>Sulphuring</u>

Sulphuring procedure was demonstrated using different chambers for different batches of fruit. Sulphuring was repeated with different quantities of fruit several times in each course. Symptoms of satisfactory and unsatisfactory Sulphuring in the fruit were explained. Permissible Sulphur levels in the fruit product was explained. A sample of the dried apricots was sent to a Lab. by MCI for analysis. the results will be available in due course. Dr. Tsamparlis plans to take several samples back to Greece with him for analysis too.

Packing and storage

Two different size plastic bags were used for packing appropriate amounts of fruit for retail sales. A fairly attractive label was put on these packages.

Internationally acceptable card board boxes holding about 12.5 Kgs dried apricots for larger shipments were explained to the participants.

II. Culture and production

Considering the limited time available for the course which was planned to coincide with the first crop of apricots to be used to demonstrate drying techniques, training in the cultural methods was kept as brief as possible. Following aspects of production were discussed.

a) Spacing, layouts, planting and training the trees.
b) disease and pest control
c) Fertilization
d) Grafting and budding

Practical training in grafting and budding was given only to the participants of the refresher course who had a chance to make a field trip. Time did not permit for this to be done with the participants of the introductory course.

Performance of the incumbents last year and the impact of their work.

Since the technology of Sulphur drying apricots is so simple and the result so obvious immediately resulting in much higher price for the product, the impact of the programme has been very great. The general information is that those farmers who dried some apricots with Sulphur were able to sell them at twice the price of those dried in the traditional way. Comments have been made by the incumbents about the fact that if they no longer have jobs with DAI or MCI they can earn their living by contracting with growers for drying apricots.

Constraints in the way of increasing production of high quality dried apricots acceptable by the market.

a) There are no large plantings of a standard variety of apricots in Afghanistan. Trees in many areas are seedlings each of which produces a different apricot. Such heterogenous production is difficult to market in today's markets.

There are exceptions to the rule, however. There is a table variety of apricots Charmaghs grown in Kandahar in fairly large volumes and another Amiri grown in Logar, Ghazi and Maidan again for the fresh market. There is Saqui in Kahmard of Bamyan and a couple of other varieties in Ghorband of Parwan and Samangan provinces all for drying which again are produced in big volumes.

b) **Insect and disease damage**

Certain insects and fungus diseases attack apricots which make the end product unacceptable by markets. Control of such pests is very easy but unfortunately the growers are unaware of the measures.

c) **Processing and packaging**

At some stage there have to be processing plants which will clean, grade and pack the product properly for the market. Such plants don't exist for apricots. Introduction of such plants for raisins gave grape growing a tremendous boost. The same plants with certain adjustment may be able to handle apricots especially that the harvests of the two crops do not overlap.

Recommended strategies

A. **In the production field**

A survey of all the existing apricots varieties is necessary to determine one or a few varieties to be used by growers. There is little doubt that a variety can be located in Afghanistan which may have superior qualities than any known to the markets yet.

a) A few trees of known varieties should be imported for testing in Afghanistan and if successful could be propagated.

b) As there are no budded trees of known varieties available in the country nurseries should be established preferably by private farmers for use by interested growers.

c) Top working the existing trees which do not produce desirable fruit should be undertaken so that they will all produce high quality fruit. This will change the quality in a matter of a couple of years.

d) It is worth while to under take a programme of apricot tree planting in areas most suitable for this crop.

e) Technical assistance by extension agents is always needed not only for successful production of apricots but also for all other crops. Afghan farmers know very little about the most elementary steps in improving quality and production.

## B. In the Marketing field

Farmers or traders or both have to be trained in improved processing and packaging of apricots. This alone will mean as much more income for the producers as they are getting now.

Involvement of High Value Horticulture in training staff to work with the farmers is a great step forward. It would have been much better if the original proposal of HVH which included work with traders in processing and marketing was approved. This could accelerate progress in overall production because the produce would have brought higher income and been great encouragement for growers.

Following actions are needed in an attempt to increase production and sales.

a) Training farmers in producing acceptable quality product efficiently. This is covered under production field.

b) Teaching farmers or traders or both the method of drying apricots properly.

c) Establishment of processing and packing facilities.

## Introduction

The consultant arrived in Quetta on May 22 and left Quetta on June 11.

This consultancy was a follow up on the training given to some DAI + MCI staff in drying and production of apricots last year. Also to give training to new DAI + MCI + several other NGOs staff who will demonstrate sulphur drying of apricots during the 1992 season for the first time. This time the consultancy included the evaluation of the performance of the staff who were trained last year.

The terms of reference were as follow:

## Proposed Apricot Sulphuring and Drying training Courses June 1992

### Statement of Purpose

MCI/DAI seeks to implement introductory and refresher level Apricot Sulphuring and Drying Refresher courses in order to increase the number of Afghanistan-based extensionists, businessmen, and farmers available to work in the areas of apricot culture, post-harvest processing, and handling.

### Time Frame

The 5-day refresher course for the individuals who completed MCI/DAI's 1991 training will be held May 24-28 in Quetta. This will allow participants to return to the field for extension visits and [fruit drying] technology promotion at the time of harvest in target areas.

The introductory level training course shall be held May 30-June 8 in Quetta, and shall be open to 40 participants from MCI, DAI, and other interested NGOs.

### Course Design

1. Refresher Course

A. **Goal:** To enable participants to acquire skills necessary for high quality dried fruit production.

B. **Resource Specialists:**
Dr. Abdul Wakil
The participants themselves, as they work together in experience/observations.

## C. Course Content

1. Techniques for sulphuring (since no fresh fruit will be available, the course will focus on those elements of sulphuring and drying which can be addressed in the absence of fresh fruit)

2. Tray configuration
3. Cleanliness
4. Sweating of dried fruit
5. Packaging of dried fruit, including maintenance of proper moisture content)
6. Marketing

## D. Teaching Methodology

1. Informal structure, to allow maximum opportunity for participants to interact with each other and with materials/methods presented.

2. Use of relevant materials, i.e., adobe sulphuring rooms, plastic tents, plastic drapes or tarps, various tray configurations, different typed of sulphur.

2. Introductory Course

A. **Goals**

1. To sseminate practical knowledge of apricot production and post harvest handling and processing.
2. to stimulate interest among Afghan extensionsts, farmers, and businessmen for the profit-making possibilities in dried apricots.
3. Initiate contacts between Afghanistan based agriculturalists and businessmen and Pakistani fruit processors and dried fruit buyers.

B. **Resource Specialists:** Dr. Abdul Wakil
Dr. Michael Tsamparlis (HVH available from June 1)

C. **Course content**

1. Apricot culture (Dr. Wakil)
   a. Guidelines for apricot culture in Afghanistan
   b. Limiting factors and appropriate solutions for problems associated with apricot culture in Afghanistan

2. Apricot preservation (Dr. Michael Tsamparlis, with input and translation by Dr. Wakil)
   a. Theory and practice of apricot preservation by sulphuring and drying

3. Packing and marketing
   a. Techniques and theory of post-drying quality retention (Dr. tsamparlis)
   b. Appropriate adaptations of packing and marketing for Afghanistan

[a. and b. will include significant emphasis on simple packaging techniques to maintain optimum moisture content and cleanliness].

D. **Teaching Methodology**

1. Seminar format with formal presentations by major resource speakers, less formal sessions with Pakistani fruit processors, and dried fruit buyers, and practical sessions focusing on applied methodology.

The training for the first group and evaluation of their performance was done by this consultant but Dr. Tsamperlis of high value horticulture (HVH) joined on June 2nd for the training of the new staff.

In addition to the drying techniques classroom training was given in the planting and care of the apricot orchards and general production of apricot fruit.

Selection of varieties acceptable by the international markets is important. Emphasis was placed in looking for such varieties to be determined for future propagation. There are some three varieties which have good markets in India and Pakistan and are grown in fairly large volumes at the present time. These can have markets in the west provided insects and diseases are controlled in the orchard and the fruit is processed and packed properly. These varieties should be used for propagation now until a better variety can be determined.

The consultant wishes to acknowledge the most sincere cooperation of MCI in the implementation of the training course. Any materials, equipment or facilities needed were very promptly made available by this organization and no effort was spared in making sure that the training course proceeded as desired.

Mr. Tom Brown, Myron Jespersen, Bob Saum Rahmatullah, Sayed Mohammad and Reday personally stood ready to contribute and help. From DAI Mr. Malham and Mr. Naqeebullah stayed with the course through its duration and Mr. Noori and Don Olsligle visited and gave necessary direction. Richard smith who happened to make a trip to Quetta also visited the course participants. Ray Renfro was kind enough to make a special trip on June 3 and examine the progress of the training. Danzel Phillip of HVH came to Quetta with Michael Tsamperlis and was with us some three days.

The refresher training course - topics coveredd.

Following are topics that were covered in the lectures and practical demonstrations during the course.

a) **Testing Sulphur from different sources for their burning quality.**

Sulphur from 4 different sources were tested. One was from the "standard supply Co" in Peshawar. The second imported from Korea and available on the market. Third was sulphur which MCI obtained from the plant pathology office of the Saryab farm.

These were all in a fine powder form. The fourth was purchased from the local Pahansari. (Shops which sell herb medicines, various spices etc but also things like sulphur, Borax and Sodium nitrate). The sulphur from this source was in the form of bars apparently used by people for burning in homes to get rid of bed bugs and other house hold insects.

Of these Sulphurs two were found to be superior in ease of burning than the others. One was the Sulphur bars from the spice shop and the other was the Korean powder. The other two Sulphurs, although a little more difficult to burn were satisfactory and can be used if better sulphur is not available.

In these tests the trainees became well aware of the fact that not all Sulphurs burn with the same ease.

The use of Sodium nitrate ($NaNO_3$) to help sulphur burn better and that of spirit in getting the sulphur to ignite was also demonstrated.

b) **Alternative Sulphuring Chambers**

Due attention was paid to the construction of Sulphuring chambers demonstrating models that would be simple using locally available materials and crafts man ship. Also to fit the economic and other conditions in which Afghan farmers live.

A small 1.25 x 3 x 2.25 meters quarter was built using bricks and mud plaster to which finely threshed wheat straw was added. This is the nature of the construction used to build adobe houses and other small and large quarters in Afghanistan. A door was made for this with bolts put in the frame and holes in the outer edges of the door to fit the bolts so that the door could be shut tight with the use of nuts and bolts. A gasket of rubber using old truck tubing rubber was nailed around the door frame to make it airtight.

There was a small hole left under the door frame near the ground and another in the far wall of the room near the ceiling for ventilation. These ventilators could be made smaller by sealing with mud or partially by putting a piece of clod in the holes.

A second chamber 3 x 3 x 2.25 meters such as is commonly used by farmers in Turkey was built again from locally available material similar to the smaller chambers described above. A third chamber was made by erecting a wooden frame 2.7 x 1.7 x 1.7 meters tall using small poles. This was covered with a sheet of poly ethylene and the edges which lay on the ground were sealed with sand. Some adjustable ventilation was allowed in all the chambers.

The Turkish style chamber had a fire place in one of the corners with a metal heater such as is commonly used by people in the area for heating rooms was fitted in this fire place. A chimney was put on one side of the heater and taken out through the wall to take the smoke out. A Sulphuring pot to hold 3 or 4 Kg. of Sulphur was fitted tight on the top of the heater which was open. Mud and sand was used to make the joint between the pot and the heater air tight. Wood was burned in the heater from outside to heat the Sulphur in the pot inside till it was ready to burn and also some heating applied until all the Sulphur burned away.

A small glass was fitted in the wall near the Sulphuring pot to enable one to examine the burning of the Sulphur from out side. The door to the chamber which was made of wood same as any door in houses was covered with a sheet of plastic to block the cracks and rubber was again used around the frame of the door for adequate sealing.

All these chambers worked quite well.

Tray manufacture and design

This is the most expensive item in the whole process which needs capital that is greater than most small farmers can afford.

There is a lot of poplar grown in almost all provinces of the country which is a suitable material to make trays from. But it is not very cheap even in normal times. Under present conditions when most of such trees have been destroyed and there is an abnormally high demand for what is still available due to the refugee influx the price is higher still. Price for a tray which would hold only seven kilos of fresh cut apricots is as high as Pak rupees (equivalent of) 100. The investment in trays by a farmer whose average production is 14 tons of apricots per year would have to be Pak rupees 40,000. It is very important therefore to try to design a tray which would cost less.

Tray design depends more on what materials are available locally and what is the most economical to use rather than any fixed dimension. In Pakistan it is cheaper to make smaller trays than the size used by most operators in the west which is usually about 1.25 x 2.5 meters. These are normally moved by wheeled trolleys or machines.

For our purpose a tray of .6 x 1.20 M inner dimensions was found to be adequate considering the price of short and long pieces of lumber and ease of moving from place to place. Use of metal in the trays or in the Sulphuring room is not advised as the $SO_2$ will corrode metals and fruit is likely to be contaminated with Sulphates.

All concerned are trying to come up with a cheaper design for trays. However complete success has not been achieved yet.

MCI has come up with a tray that will hold about 3.5 Kgs. of fresh cut fruit which cost about Pak rupees 14. This may be an affordable investment in areas where such cheap lumber can be found. Some people in Kandahar have used flat baskets made of tree shoots and different matting material made of certain wild plant leaves. These are not ideal but can perhaps serve the purpose. The Pak x Swiss fruit development project in Swat have used a plastic mesh material fitted on a wooden frame which may be cheaper but not as convenient as whole wood trays. In other words many agencies and individuals are thinking hard to come up with designs and material which will cut costs.

Experience shows that when a real need is felt by a large number of people some-one in the society succeeds in solving the problem.

Grading the fruit

The importance of grading the fruit was emphasized to the trainees. Grading was done based both on size and maturity. The trainees realized the value of high grade fruit. They witnessed the much lower quality of dried product from low grade or green apricots and also the higher labour cost involved in preparing these for drying compared to the mature high quality fruit.

Sulphuring

The different chambers were used for different batches of fruit. These batches of apricots were sulphured and dried by the trainees. During this practical training the trainees experienced the burning qualities of Sulphur, the effect of ventilation and its adjustment the duration of burning and the final effect of Sulphuring on the fruit. They should be able to tell the difference between good and poor Sulphur absorption by the fruit after the Sulphur treatment by looking at the condition and appearance of the fruit.

Training was also given in the amount of Sulphur to be used in treating different amount of fruit in different size chambers. The international limits for the Sulphur contents of the dry product was explained. Also the need for resulphuring under certain conditions.

See annex for more details

Drying practices

The importance of cleanliness and general Hygiene was emphasized in achieving high quality in the end product. Actions necessary to protect fruit during drying from ants, flies, dust storms and rain were realized by all participants as all these elements came to play during the course of the drying. The moisture content to be retained in the fruit at the conclusion of the drying process was explained and practice was given to the trainees in determining the right stage at which the dried fruit must be collected and packaged or stored.

Packing and storage.

Two size plastic bags adequate for packaging for samples or retail sales accommodating 250 grams, 500 grams and 1000 grams dry apricots were procured. Also a number of cardboard boxes holding about 12.5 Kgs of dry fruit which is the international size for whole sale. Dried fruit was packaged in all these containers by the trainees. A fairly attractive label showing that the content of the package was "dried Afghan apricots" packed in 1992 season was printed with a picture of an apricot and writing in both English and Dari was printed and put on each package. Quite a large number of such packages were shared by MCI and DAI.

Training in General Culture and Production of the Apricot fruit

Time did not permit to do any practical training in this field except for one field trip which was made to some apricot orchards in Kochlagh of Quetta. Some practical training was given during this visit. However class room training was given to the trainees in the culture of apricot trees to the extent possible. Topics covered were.

a) **Spacing and training the trees**

During the field trip importance of proper layout and spacing the trees was explained. The disadvantage of crowding which was the case in most of the orchards visited was emphasized.

b) Also during the field visit proper training of the tree and the distribution of scaffolds was explained. The trainees could see the disadvantages of wild uncontrolled growth of the trees in the orchards visited.

c) **Diseases and pests**

In the visit to the orchards certain diseases and insects attacking the apricots were observed and necessary information given to them. This was also discussed in the class room.

d) **Grafting and budding**

While in the apricot orchards practical demonstration was given to the trainees in T budding, Chip budding and whip and tongue grafting.

e) **Fertilizing**

This topic was discussed in fair detail in the classroom. The conventional practices were compared with the modern more scientific methods. The trainees were advised to demonstrate these methods to the farmers.

The Introductory Level Training Course

This course started on June 1, 1992. Although the assignment of this consultant for this course was apricot culture rather than drying, as it happened the first two days were spent in cutting, Sulphuring and drying apricots. This was because a fairly large quantity of apricots was left over from the refresher course because it was too green at the time. This was in storage to get riper and was ready to use on June 1. To not waste these apricots they were cut and sulphured by the introductory course participants. These apricots were still not suitable for drying as they could not be separated from the stones although they had turned softer on the surface. For this reason they were sulphured whole and pitted later with some difficulty. The dried product was naturally not first glass but it was good experience for the trainees as they fully realized the disadvantage and problems of using green apricots for drying.

Dr. Michael Tsamparlis arrived on the afternoon of June 2 and took over the drying aspects of the course from then on.

This consultant accompanied Michael throughout the rest of the course and contributed with necessary input and translation.

During the period from June 3-8 a total of one and a half days were allocated for this consultant to give the trainees different aspects of apricot culture and production. This was done along the same lives as for the refresher course itemized and explained earlier. However time did not permit visit to any orchards with this group to give the practical demonstrations which were done for the first group in the field.

There were some individuals in this group who came from intensive apricot growing areas and had apricot orchards of their own. They were given specific instructions within the class about operations which they must substitute or add to their regular conventional operations for best results. They were advised to do this only on part of their orchards in the first and perhaps second years until they and others in the area were convinced. There is every assurance that considerable change will occur in farmer practices in time to come as a result of such demonstrations. These recommendations were discussed and explained to all the participants who obtained the benefits of these practical case studies.

Post Harvest Handling Of Apricots Including Drying Techniques And Quality Control

These aspects of the course were handled by Dr. Tsamparlis who will submit a report on the details of the topics covered. This consultant kept Dr. Tsamparlis company through out the duration of this course and contributed with necessary input and translation as needed. It is therefore not necessary to report details of this activity here as it will be a repetition of what will appear in Dr. Tsamparlis report.

Farmer interest in improved drying methods

Discussing the degree of interest on the part of the farmers with the trainees who demonstrated sulphuring last year showed that the majority were very enthusiastic. The product which was treated with sulphur sold at least at double the price of the untreated product.

Several of the boys talked about certain farmers begging to borrow the trays that the trainers had for a few days and a little sulphur to treat some of their apricots. In some cases during the end of the demonstration season this was done for some of the farmers and it is those people who were able to sell the treated product at a higher price. Many people kept the treated apricots to use or sell during the month of Ramadan (Fasting) when much of it is used especially if this month falls during winter when fresh fruit is not available.

According to the staff who worked in demonstrating the technique last year a few farmers expressed willingness to treat all their produce in the following year (1992). But there is bound to be a delay in adopting the new practice by the farmers for the following reasons.

a) It is normal that farmers in countries like Afghanistan take considerable time to make up their mind to change.

b) The demonstration of Sulphur treatment takes place at a time when the fruit is ripe and ready to pick. The producer has already made plans to either market or dry in the traditional way. He cannot at this stage change his plans suddenly and make necessary adjustments to use Sulphur treatment the same year.

c) Sulphur treatment requires certain investment which although small is more than a small Afghan farmer can afford. The biggest item in this case is the cost of trays to be used in sulphuring. Lumber is rather expensive and substantial cash is needed to manufacture enough trays for the treatment. An average farmer with about 3 Jiribs or half hectare apricots trees assuming a 15 day picking season and a total of 14 tons of fruit to be dried in five lots - one every three days will need 400 trays. Last year the incumbents were able to get such trays made at Pak. Rupees 100 each. This year due to the influx of refugees going back to Afghanistan the price may be higher. This means that the 400 trays will cost at least Rs. 40000. When you add Sulphur and labour etc it can easily go up to Rs. 50000. this investment is too great for such a subsistence farmer. This fact goes to show that assistance is badly needed either by the trader who will buy the produce or by a credit facility as perhaps a short term loan. These trays can be saved for several years eliminating need for repeated assistance or loans.

Therefore one must realize that if the adoption of Sulphur treatment is slow that the reason may not be lack of interest on the part of the farmer or absence of economic justification of the process but rather the capital investment involved.

Problems in the way of expanding dry apricot exports.

There are several constraints in Afghanistan becoming an important exporter of dried apricots. These are all possible to solve but time would be required. There are also positive aspects of this trade in favour of Afghanistan that would make it possible to expand its exports. These are discussed as follows.

a) Volume of production of marketable product. Most of the Afghan apricot trees are seedlings which have not been budded or selected for quality. Therefore, although among them there may be fruit of high quality its production is confined to one or a few trees. The bulk of the produce is a mixture of innumerable varieties which have enough difference in size and color to make them un-uniform.

Some districts and provinces are exceptions to this rule e.g. certain areas in Oruzgan produce a standard apricot variety in large quantities. This has found its way into the Indian market and the whole production is exported to that country with room for more in the market. However this product cannot be exported to Europe because it usually carries an insect which although present in only a few of the fruits make it unmarketable internationally.

Kahmard and Surkh in Bamyan and Ghorband in Parwan Province are other areas where standard good varieties are produced in volume and exported to cities in Afghanistan and Pakistan. The export of these to Europe has not taken place because of the color and texture. Traditionally dried without the application of Sulphur the product assumes a dark or partly black color and a very hard texture. Similarly Samangan is the home of good almond and apricots. It exports dried apricots internally within Afghanistan and also to Pakistan and India. These are again not treated and do not have acceptable color and texture.

Logar, Ghazni, parts of Wardak and Arghandab in Kandahar produce good quality apricots for the fresh market which are not very suitable for drying. Much of this production is exported to Pakistan.

b) **Insect and disease damage**

Unfortunately the majority of the Afghan producers are not familiar with control measures for insects and disease. Technology in this connection was beginning to be transferred to the farmers when the war came. During the 14 year war no technical assistance of value has been given to the farmers and no necessary chemicals have freely been available on the market. Therefore nearly all fruit dried and fresh is infested with some disease or insect. This quality fruit can only be marketed within Afghanistan or as far as Pakistan and India.

Attempts have been made by various exporters to market Afghan fruit products including dried apricots in the west, but in many instances have been rejected by the customers who have found insect damage or foreign materials in them such as grit etc.

The one item which did find its way to European markets is raisins. This was because raisins under Afghanistan conditions have no insect enemies which enter the fruit and are carried to the consumer. However although raisins are generally free from insects they only found their way to the western markets after raisin processing plants were introduced into the industry and the raisins were cleaned from all foreign matter and packaged properly in internationally acceptable packages.

c) **Processing and packaging**

As mentioned above Afghan raisins although free from insects were not able to be marketed in the West until such time as processing plants and proper packaging came into the picture. The same is true of other products. Proper packaging has to be used for products before they can be accepted by international markets. This has not been done in the case of fruits other than raisins.

d. The factor in favour of Afghan fruit is the climate. This factor is responsible for the high quality of fruit grown in much of Afghanistan. Color and flavor of fruit grown over much of afghanistan is generally better than same fruit grown elsewhere. The bright sun and the dry air contribute towards high quality.

Recommended Strategies

**A. In the production field**

In trying to expand production and find international markets for dried Afghan apricots the following actions must be taken simultaneously:

a) A survey must be made of all the apricots presently grown in the country and one, two or three varieties be selected which are most acceptable by the international markets.

From information brought by the apricot incumbents who demonstrated Sulphuring last year, it looks like high quality apricot can be found in the country. It may even be possible to find one that is superior to any known to the markets so far. These varieties should then be used for propagation for the dry fruit market.

b) A few trees of the known varieties should also be imported from abroad and studied under Afghan conditions to be multiplied later if found suitable.

c) As there are no budded trees of known varieties available in the country, nurseries should be established in the present or potential growing areas to grow trees of good varieties to be used by interested farmers. Those nurseries can best be grown by private farmers and nursery men. But technical or even financial assistance in some form is needed in the initial stages until the growers gather the knowledge and experience it takes to grow a nursery.

d) There are a lot of apricot trees grown in Afghanistan now. Some are good varieties and their product is marketed for good income. Others are relatively useless being heterogenous seedlings the product from which is sold locally or in the neighboring Pakistan for small prices. These trees can quickly be changed to very high price varieties by top working i-e cutting the main limbs back to near the main stem and putting grafts of good quality fruit on them. These trees will start producing internationally acceptable varieties in two years. In this way large volumes of marketable fruit can be produced quickly.

e) It is worth while to undertake a project of promoting apricot tree planting especially in those areas most suitable for its production.

f) Along with the above steps technical assistance must be made available to the growers in the most efficient production of high quality fruit free from diseases and pests.

**B. In the marketing field**

As work begins on the production side there should be action taken on the marketing side as well. Involvement in some way of exporters who handle dry fruit exports into the programme is important. An exporter will welcome the opportunity of marketing a better product even in his existing local, pakistani and Indian markets. For markets in Europe which would be new to most exporters assistance by some experienced marketing agencies will be needed.

High value Horticulture Inc (HVH) of England had a very attractive and sound proposal for DAI where in addition to training Afghan producers recommended working with Afghan exporters in promoting exports to the west. This was to include helping Afghan traders in proper processing and packaging and participating in International trade shows to display their products. This would have completed the chain which has to be in place before the increased production can bring benefits. Unfortunately the marketing component of the programme was eliminated while only the training part which is important in itself is in place. Dr. Tsamperlis's presence in this training course was part of the HVH contract with DAI.

In brief the following actions will be required in an attempt to find a place for Afghan products in the international markets.

a) Training farmers in producing acceptable quality product efficiently. This is covered under production field.

b) Teaching farmers or traders or both in drying apricots in a way that would be accepted by markets. This will involve sulphuring for the time being until varieties or techniques and practices can be identified to come up with products which can be marketed without Sulphur treatment.

c) Establishment of processing and packing facilities.

Producers and especially exporters must be trained in appropriate processing and packing exportable products in standard packages. These facilities could be demonstrated and perhaps made available to exporters against a fee initially with the understanding that exporters will install such facilities of their own when they realize the advantage of using them.

Fruit growing a subsistence farming in Afghanistan

Afghanistan was and still is famous for its fruits. Fruit growing is concentrated in certain districts and valleys. Different fruits are growing in different valleys. Kohdaman in north of Kabul and Kandahar in the South West are famous for their grapes. Ghazni for its grapes and dried plums. Andarab for its pears. Ghorband and Kohkahmard for their apricots. Mardan and Wardak for their apples and Kandahar and Ghorband for their pomegranates and so on.

As it happens with the exception of Kandahar which is also a good grain growing area most of the other areas mentioned are high altitude very cold areas which produce poor grain crops. The new high yielding varieties can not grow there.

Also as it happens population pressure is greater in these fruit growing areas and so the land holdings are very small. One Hectare is considered a large holding and the owner a rich man.

These people grow fruit of necessity and not for luxury. They all live a subsistence life. They could not survive if they decide to grow grains on that property. Fruit trees in general have been so damaged by war and run down by neglect that to make the industry economical they have to be gra' bed and replanted. It is important to help these people if they have to survive.

Performance of trainees and the impact of their work

Since the technology of Sulphur drying apricots is so simple and the result can be seen immediately in the clearer, more attractive color of the dried product resulting in greater income to the farmers and the trader, the impact of the programme has been very great considering that it has been demonstrated only once. Most of the incumbents in the projects are very enthusiastic and have even been commenting during the course about the fact that if they no longer have the job with DAI or MCI they can contract with growers for drying of apricots and get more income than working with these agencies.

The general information is that those farmers who dried some apricots with Sulphur were able to sell them at twice the price of those dried in the traditional way.

At least one of the traders involved (Rahmat Bros) has asked DAI (which applies to MCI too) to send samples of one or two varieties of dried apricots of which at least 17 tons i.e. one container can be available immediately when the season starts. He intends to send this to potential customers and if acceptable will buy 17 tons or more this season for export to Europe.

The persons employed by both MCI and DAI although not graduates of agriculture are practical farmers brought up in apricot growing districts and are familiar with the traditional methods of growing this fruit. They have good leadership and can easily convince farmers about the advantage of quality and marketability. In fact there are individuals among them who are exceptionally competent for the job and are very influential people in their society carrying great respect of the people in their villages and district.

Annex

Sulphuring Procedure

The highest permissible level of Sulphur in dried apricots is 2000 ppm. Many countries do not accept any thing more than 1500 ppm. The higher the Sulphur content in the dry apricots the longer they will keep in good condition in storage. Therefore those who dry apricots have to hit a happy medium which would preserve the fruit for several months and at the same time be low in Sulphur content.

Theoretically burning 1 gram of Sulphur for every kilogram of fresh fruit should give an adequate Sulphur content. However it is necessary for the Sulphur to continue burning for at least 2 hours or preferably through the duration of the Sulphuring. Therefore the minimum amount of Sulphur to use cannot be less than about half to one Kilogram no matter how little the amount of fruit or how small the size of the Sulphuring chamber.

In practice an average farmer normally dries about 2-2.5 tons of apricots at a time and uses a chamber 3 x 3 x 2.10 meters. He would burn 3 Kilograms of Sulphur in such a case. The Sulphur normally burns for at least 2 hours in this situation. Also considering the fact that the farmer hires labout for the full day and must use it efficiently the normal practice is to pick fruit from the trees early in the morning when it is still cool, bring it to a cool shed. grade it ready to be cut. The fruit is cut and trays filled in the afternoon and at the end of the day the trays are places in the Sulphuring room. The Sulphur is ignited late at the end of the day and burning watched before time to retire. If Sulphur burns out the vents in the Sulphuring room are closed to keep the fumes inside the room until morning when the trays are taken out. This normally gives a total of 8 dents for the trays inside the chamber.

Best results are obtained if there is good drying weather when trays are taken out. They should immediately be put in the sun for drying to start quickly. If there is cloudy rather cool weather and the apricot fruit does not dry quickly the fruit is likely to lose some of the Sulphur it has absorbed and the Sulphur content in it will drop. Under such conditions resulphuring may be necessary for a few hours to get desirable results. Resulphuring is needed more in wet weather when drying conditions are not adequate for quick drying.

Symptoms of adequate Sulphuring are:

1. The cups of the apricot halves should be nearly full of juice but not running over. The skin of the fruit should peel off easily.

Ripe fruit with high Sugar content absorbs Sulphur better than green fruit. Therefore green fruit needs longer Sulphuring. This makes it important to either not pick and Sulphur green fruit or Sulphur it separately from ripe fruit.

Sulphur specially made for burning which is called "burning Sulphur" is more desirable if available which is not the case in Afghanistan then the Sulphurs available should be tested for burning before use.

It is best to use the same chamber, same Sulphur and same amount of fruit every time when Sulphuring as uniform results will be obtained.

Some Sulphurs do not burn well when cold. These have to be heated to a certain temperature before they will burn. This is why in turkey they have heating arrangement in the Sulphuring room as explained under Sulphuring chamber in the report.