



## Apricot Production in Afghanistan



Developed by

**Kitren Glozer and Louise Ferguson**

**Department of Plant Sciences**

**Mark Bell: Editing and manual layout**

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# 1. Distribution: Where did apricots come from and where are they grown?

The apricot originated in northeastern China (see Map 1) and has been cultivated there for more than 3000 years. From there it spread west throughout central Asia.



Today, the main areas of cultivation are Mediterranean countries, Europe, Middle Asia, America, and Africa. Turkey produces 85% of the world's dried apricots.

<u>World Production of Apricots (metric tones)</u>	
Turkey	2,681,474
Iran, Islamic Rep	500,000
Italy	225,000
Spain	199,462
Pakistan	159,200
Ukraine	121,000
France	112,000
Morocco	107,500
China	104,350
Greece	98,000
Egypt	80,000
US	79,844
	73,660

Afghanistan has a long history of growing apricots and the local varieties are hardy, good quality and among the most pest-resistant. Afghani apricots are used both fresh and dried, with much of the dried crop selling to markets in India, Russia, Ukraine and the Czech Republic.

Apricot is native to regions with cold winters. The tree is slightly more cold-hardy than the peach, tolerating winter temperatures as cold as  $-30^{\circ}\text{C}$  or lower if healthy. In Afghanistan, the limiting factors in apricot culture are: (1) spring frosts, which can destroy the crop, and (2) lack of water. Apricot flowers very early (February to March), and late spring frosts often kill the bud and flowers. Dry climate is best for good fruit production and disease control, but orchards need enough water every year to survive and bear a crop.

## 2. What kind of fruit is an apricot?

The apricot (*Prunus armeniaca*) is a stone fruit, as are plums, peaches, nectarines, cherries, and almonds. Stone fruit have a single seed covered by a hard, thick seed coat (or 'shell'); together the seed (or 'kernel') and the seed coat are called a 'pit' or 'stone'. Both the kernel and the shell have economic uses in addition to the food value of the fruit flesh. Apricot blooms early in spring and has a short maturity period, so that it is ready for fresh market in early summer (May or June) in the plains, or September to October in the highlands.



Apricots are grown on trees that reach heights of 3 to 13 m. The fruit is 3.5 to 6.5 cm wide and require 3 to 6 months to develop and ripen. After harvest, the apricots have extremely short shelf life and need to be eaten fresh within a few days; otherwise, the fruit should be dried or processed for juice, jam, or canning.

Flowers contain both male and female parts and most apricots are self-fertile, although they will set a better crop if another variety is available as a pollinizer. A few apricots are not self-fertile and require compatible pollinizers. Pollination is by insects, usually honey bees. The trees have separate buds for flowers and leaves and the flower buds are more susceptible to killing frosts or too little chilling, which can also kill the flower



buds. Flowers and fruit form on both one year-old wood and on long-lived short shoots (spurs). Spurs are productive for 3 to 5 years and the highest quality fruit is borne on younger spurs.

Most apricots begin fruiting in their second year, but substantial bearing does not begin until 3-5 years. Fruit require 3-6 months for development, depending on cultivar. The fruits vary in size from 30 to 120 grams. The pulp of the fruits is either yellow, orange, or white. The pulp is dense, fleshy and of high quality. Sugars' contents is 6.2–20%, acids'- 0,25–1.8%. An average crop from a 20–30 year-old tree reaches 150–600 kilograms, and 100-300 centers from a hectare.

Varieties differ based on:

- Cold-tolerance and chilling requirement
- Precocity (how young a tree is when it starts blooming)
- Time of bloom and maturity
- Fruit size, shape, skin and flesh color, firmness, freeness of pit, flesh texture and taste
- Crop load
- Disease resistance



### **3. Where do apricots grow in Afghanistan? What varieties are grown?**

Apricots grow in the low land plains (Kandahar 1015 m, Nangahar) as well as the high lands (Logar 1800 m, Kabul 1800 m, Wardak, Parwan, Ghazni 2200 m, Kapisa, Herat, and Nangahar). The elevation of growing areas in Afghanistan ranges from 400 to more than 2000 meters. The varieties that are grown can be separated by elevation and how much chilling weather the varieties need to flower and fruit, as well as how 'cold hardy' each variety is. The chilling requirement of low land varieties is from 400-700 'chill hours', while upland varieties need 800-1200 chill hours. One 'chill hour' is an hour at or below 7 °C. The temperature at day time during fruit maturity is from 35-40/42 °C in the low land plains and 25-35 °C in colder high land areas. 'Cold hardy' means how cold the tree can tolerate without flower and leaf buds dying.

The varieties grown in Afghanistan include native varieties and introduced varieties.

#### **3.1 Native varieties**

Separated by growing elevation, some of these are:

- Low land/plains: Charmaghzi, Qaisi, Saqi, Nuri, Travet, Badami, Travet
- Low land/plains to mid elevations: Qaisi, Saqi, Nuri, Travet, Badami
- High elevations: Ameri, Bed mushki

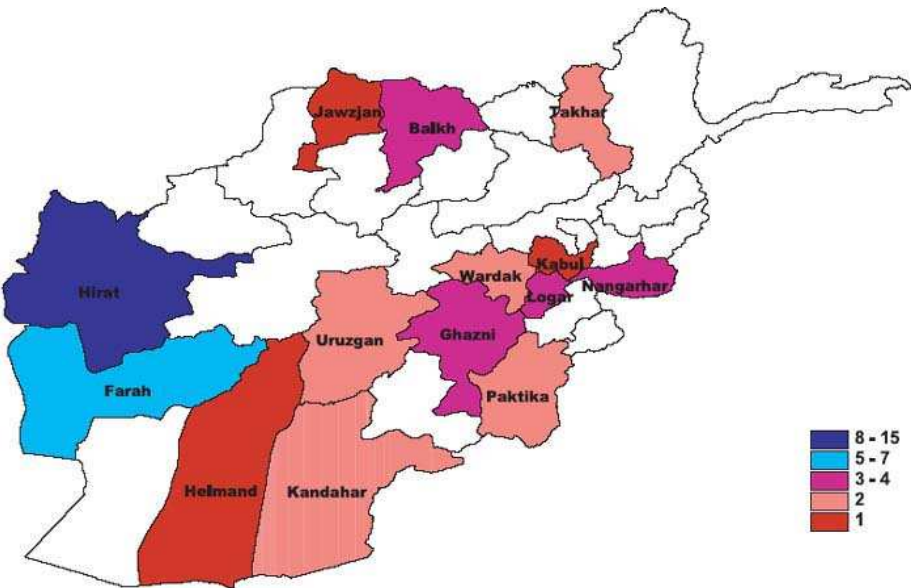
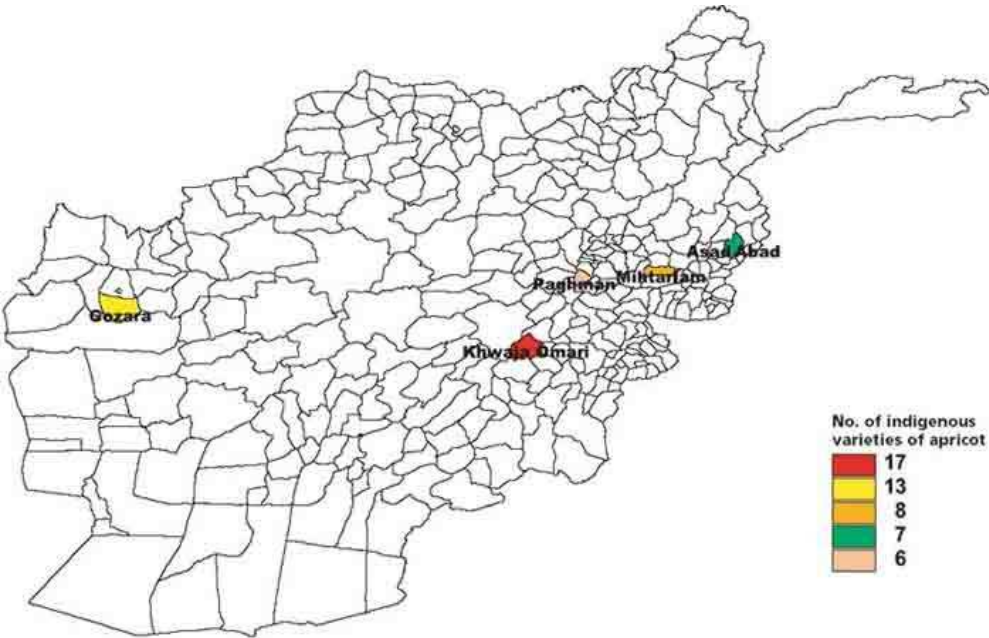
#### **3.2 Introduced, uncommon varieties**

Separated by growing elevation, some of these are:

- Low land/plains: Tomcot
- Low land/plains to mid elevations: Old cup, Redflesh
- High elevations: Moorpark, Ameri

In 2003, fruit nurseries in Afghanistan had collections of many indigenous varieties of apricots (see Map 2). Many of the provinces also had several indigenous varieties of apricots at that time (see Map 3).

Map 2. Numbers pf indigenous apricots found in provincial nurseries in 2003.



Map 3. Indigenous apricots growing wild in different regions in 2003.



## 4. Planning the orchard

### 4.1 Choosing a variety

What variety should a grower plant and why?: The grower should choose a variety that is adapted for the altitude of the orchard, with chilling requirement and cold-hardiness for either low elevation, low-to-middle elevation, or high elevation. Most varieties need at least 150 frost-free days from bloom to fruit maturity, or from the last killing frost in the spring to the first killing frost in the fall.

Lack of alternate year cropping is also a desirable trait in apricot variety selection, however, any apricot that bears heavily and is not thinned may show little cropping in the next year. Thus, alternate bearing can be controlled by thinning a very heavily-cropped tree while the fruit are still small and green.

Self-Compatibility: Most varieties are self-compatible, and set fruit without pollinizer, but fruit setting can be improved with pollinizers. The introduced varieties listed are all self-compatible. When in doubt, plant 2 or more varieties and they will most likely be cross-compatible, and set a better crop than a single variety, if their bloom times overlap.

Fruit quality: Fruit should be large and flavorful; varieties chosen in the future for fresh market should be firm enough to handle for packing and shipping. Fruit to be dried should be high in sugars; higher sugar content reduces rotting during drying. Fruit skin and flesh may be yellow, orange or white (Ameri variety, common in high elevation areas), with or without a red blush.



Examples of white and orange apricots

## 4.2 Rootstock selection

### Important rootstock traits:

- compatibility with scion
- adaptation to soil and climatic conditions
- tolerance of wet, heavy soil
- ease and uniformity in propagation
- influence on vegetative vigor
- precocity, consistent cropping and yield (lack of alternate bearing) and fruit quality
- consistent cropping and yield
- winter hardiness and bloom delay for frost avoidance
- suckering tendency
- sensitivity to disease, pests, and replant problems.

### Choices for rootstocks: (see Table 1.)

1. apricot seedlings
2. peach (*Prunus persica*)
  - a. Lovell
  - b. Nemaguard
  - c. Nemared
3. plum
  - a. *Prunus cerasifera*
  - b. Myrobalan seedling, myrobalan 29C
  - c. *Prunus cerasifera* x *Prunus munsoniana* hybrid
  - d. Marianna 2624

Apricots can be grown on their own roots (as 'seedlings'), or grafted on peach or plum rootstocks. Many orchards may have wild seedlings mixed with cultivated varieties in Afghanistan. Seedlings show wide productivity variability year-to-year, while budded trees (apricot scions budded onto rootstocks) are less variable. Apricot cultivars are most often grafted on plum or peach rootstocks. The grafted scion from an existing apricot plant provides the fruit characteristics such as flavor and flavor but the rootstock provides the growth characteristics of the plant.

### 4.3 Propagation

When apricots are not grown on their own roots, the scion variety is grafted onto a rootstock which is produced from seed (then called a 'seedling'), or produced from cuttings. The two forms of grafting used to produce apricots are (1) bud grafting and (2) whip and tongue grafting.

#### 4.3.1 Bud grafting

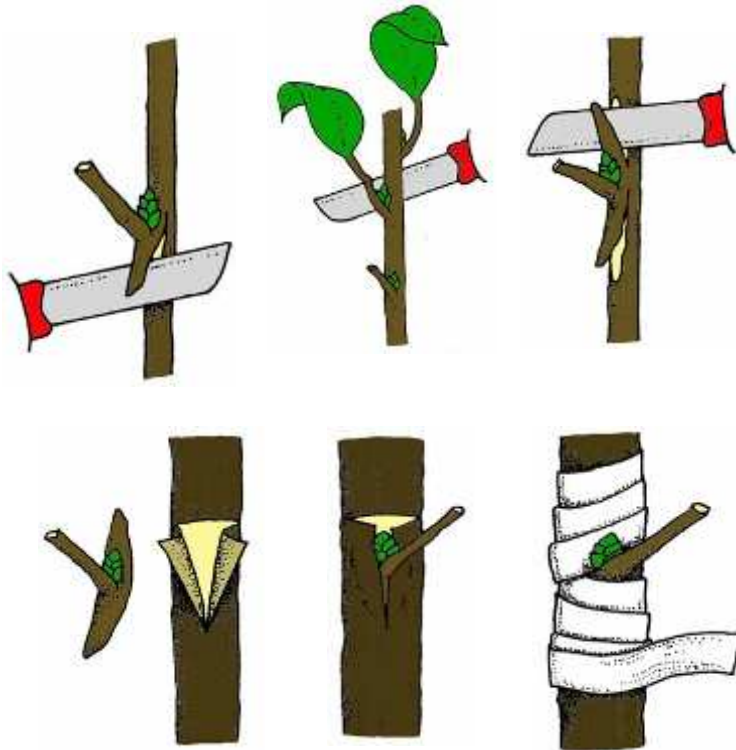
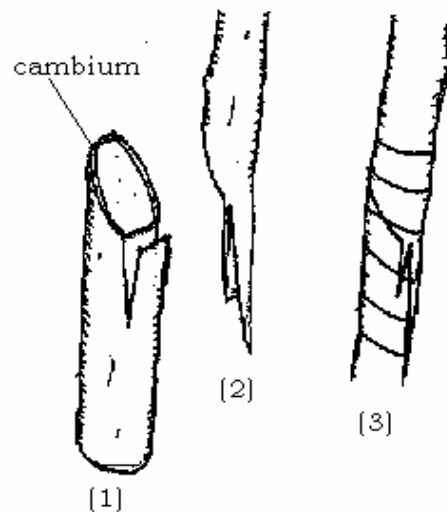


Diagram illustrating the bud grafting technique

1. Cut a slice of bud and bark from the parent tree.
2. Cut a similar sliver off the rootstock, making a little lip at the base to slot the scion into.
3. Join the two together and bind.
4. In time, the scion bud will grow into a shoot, which will develop into the desired tree.

### 4.3.2 Whip and tongue grafting



Whip and Tongue grafting

#### Diagram illustrating the whip and tongue grafting technique

1. Make a sloping cut in the rootstock with a 'tongue' pointing up.
2. Make a matching cut in the scion wood with a 'tongue' pointing downwards.
3. Join the two and bind with tape, covering the graft well.

### 4.4 Site selection and preparation

Production depends on tree size, vigor and ability to crop. The factors most limiting tree size in Nangahar fruit-growing areas include:

- climate, especially lack of abundant water by rain or irrigation, and frost, where winter temperatures may be -5 to -15 oC. If frost occurs in spring just before or during bloom, the crop can be destroyed
- soil—deep, fertile soils optimize growth; poor soils restrict growth
- fertility—to be productive, trees do best with applied fertilizers

#### 4.4.1 Site selection

Deep, well-drained sandy loams with good moisture and nutrient-holding capacity are the best soils for apricot growing. Do not plant in salty (saline) soils. Full sunlight nearly all day long is essential. Trees that do not receive at least 6-8 hours of direct sunlight each day will produce long thin branches with few flowers and fruits.

Here's a simple test to determine your soil's internal drainage—to see if you have a good site for fruit trees. Dig a narrow hole 1 meter deep and fill it up with water. If the water is gone within 24 hours, you'll have no trouble growing fruit and nut trees. If the

water is gone within 48 hours, the soil is acceptable but can give problems. If water is still in the hole after 48 hours, grow vegetables or flowers instead.

#### **4.4.2 Frost protection**

Planning the orchard to reduce the danger of frost at bloom and young fruit stage:

Trees planted in open areas and trees exposed to cold prevailing winds are most likely to suffer frost damage. Low areas will collect cold air; avoid planting in depressions or basins. Planting near structures or walls, especially those with a southwest exposure, will take advantage of heat absorbed by the structure.

- Do not plant in low areas where cold air is trapped by surrounding hills or vegetation
- Make sure the ground is firm, moist and exposed to sunlight by removing ground cover or keeping it low and not cultivating the soil during the cold months
- Plant on north-facing slopes to help trees bloom later

The best way to reduce cold damage is to maintain healthy trees. Use cultural practices that induce and maintain dormancy in winter. These methods include no late summer or fall fertilization or pruning. Vigorous trees may recover from cold injury. Weak trees that show disease, insect damage, or nutritional deficiencies are the most severely damaged and the slowest to recover.

Grass, weeds, and straw mulches prevent heat from entering the soil during the day, so less energy is stored for release at night. Keep the ground around the tree as clean and free from mulch, weeds and ground cover as possible. Avoid planting a cover crop in the orchard, or follow the guidelines under the section 'Covercrops'.

#### **4.4.3 Soil preparation, amendment/fertilization**

Prepare soil thoroughly by plowing, tilling or spading before planting. Remove all weeds. Incorporate lime and organic matter such as well rotted manure or compost into the top 20-25 cm of soil before planting. Apply lime if soil is below pH 7, at a rate of 4.5 kg lime per 9 square meters. Prepare the soil before the trees arrive from the nursery if possible.

Apricot does not usually develop many nutrient deficiencies. The level of N fertility has more influence on the growth, yield, and quality of apricots than any other single plant nutrient. Adequate supplies of N are necessary to optimize growth and development of newly planted trees.

#### **4.4.4 Pre-plant fertilization**

Compost, animal manure and green manure can be worked into the soil to a depth of 1 m, however, this should not be added directly to the tree planting hole at the time of planting, but in advance of planting so that rotting can occur and be completed prior to planting, otherwise root rot is likely. Organic sources of N, such as urea should be applied during winter and/or spring, to allow for timely decomposition and release of



nutrients. If nitrogen is to be applied, it should be applied at the rate of 20-55 kg per hectare of actual nitrogen.

#### **4.4.5 Eliminating weeds**

Many weeds compete strongly with new apricot trees and should be eliminated before tree planting.

#### **4.4.6 Planting design**

Apricots are planted in solid blocks if self-fruitful, at spacings of up to 4 to 7 meters between trees and rows. If cross-pollination is required, pollenizers can be in equal numbers as the varieties they pollinate, if the pollenizer produces desirable fruit. If the pollenizer fruit is of poor quality, plant 1 pollenizer to every 9 main crop trees, spacing the pollenizers evenly in the orchard. The most effective design with pollenizers is on a 3 x 3 tree square, with 9 trees and the center tree is a pollenizer.

Closer spacings may result in smaller trees, or if trees become too big they will shade each other out and fruit production will be reduced. Apricot trees that are well-watered and well-fertilized can grow up to 9 meters tall, but if allowed to grow vigorously to this size, few fruit will be produced. Apricot trees will develop at least a 5-meter diameter limbspread at maturity. Plant them far enough apart to avoid excessive competition. Orienting the tree rows north to south will improve light exposure to the fruit.

#### **4.4.7 Shaping your young trees**

Control size by pruning to approximately 5 meters or less so that trees only 'fill' the available space in the orchard between trees and rows when trees start producing. Apricots should be trained as 'vase-shaped' or 'open center' trees to get enough light into all parts of the canopy so that flower buds will form and best quality fruit will be produced. Generally, all new growth and interfering wood is removed each year once trees are full-size. **Trees have limited resources for growth and reproduction; if all resources are used for vegetative growth to get big trees, no resources will be available to produce fruit. Big trees do not produce more fruit.**

## **5. Orchard establishment**

### **5.1 Nursery trees and planting**

When the fruit trees arrive from the nursery, open the bundles immediately to inspect for damage and check general condition of the trees. Make sure the roots do not dry out; most fruit trees will be 'bare root', that is without soil around the roots when they come from the nursery. "Heel in" the trees if you are not ready to plant them. "Heeling in" means to dig a shallow trench in which tree roots or a bundle of trees can be covered with moist soil to protect them until planting.

Plant when the ground is not frozen, but before trees start to 'leaf out' in the winter, to allow for root development before spring growth.

During the first two or three years, the objective is to develop a sturdy tree of good size. Little or no training is given apricot trees, other than topping them at planting to assure development of low heads. It is advisable to allow the tree to grow its branches at a minimum height of 2/3-1 m to prevent fruit from touching the soil when on low limbs.

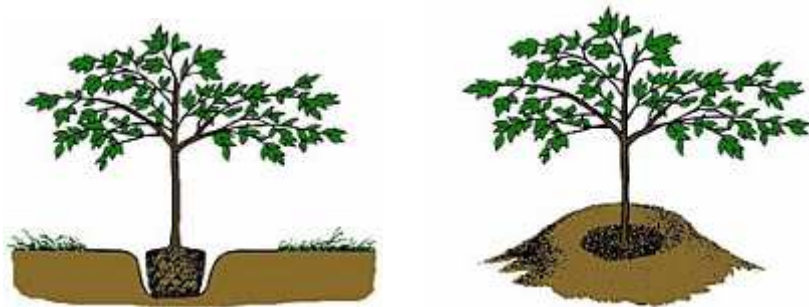
## **5.2 When to plant, How to plant**

### **5.2.1 Prepare the planting hole**

Dig a hole only as large as necessary to accommodate the root system. Trees should be planted with their top major roots even with the soil line. Prune any damaged roots back beyond the damaged area. If container-grown trees have a tap root curled in the bottom of a container, cut this root off at the point where it begins to curl. Separate and trim the roots of container trees that may be root-bound. If trees are bare-root, cut off any roots that are broken or kinked. Save the soil from the hole to use as backfill. If the hole is deeper than the measurement, prior to placing the tree in the hole, backfill with enough soil to hold the tree slightly higher than the measurement. Firmly press the soil before setting the tree on it. Be sure the root ball or container soil rests on solid ground to prevent settling. Do not add any other soil amendments to the hole, such as fertilizer or compost.

### **5.2.2 Position the tree**

Carefully remove the tree from the container, supporting the root ball. Place the tree in the hole at the same depth it was growing previously. If holes are dug too deeply, and loose soil is placed at the bottom, trees may settle



after watering. Trees set too deeply may die. Container trees should have the top of the soil ball flush with the top of the hole. Bare-rooted trees should have soil placed underneath them in a manner to allow the spreading of the roots in a natural position with no bending or crimping. Cut any circled or kinked roots and score the outsides of the root ball if it is compacted. Loose roots should be positioned facing down in the hole. The graft union should be no less than 5 to 10 cm above the soil surface when the roots are completely covered with soil.

### **5.2.3 Fill the hole**

Remove any rocks, grass or debris from the dug-up soil. Break up clods. Back-fill with the same soil that was removed from the hole. Never back-fill with an amended soil mix of a lighter texture. Such a practice will create drainage problems and cause tree roots to suffocate during periods of excessive moisture. Firm the soil around the lower roots by hand. Continue filling and firming several cm at a time. Soil should be firmly, but not tightly, packed. Pull out all weeds surrounding the planting hole. Before completion of back-filling, add water to settle the soil and eliminate air pockets around the roots. After watering, fill the hole to completion and, if necessary, construct a basin (ridges of soil around the complete circumference of the tree) to hold water during subsequent irrigations. With trickle irrigation, this practice may not be necessary. Basins are not needed during excessive rains or if flood irrigation can be effectively used at regular intervals after planting.

### **5.2.4 Water**

After the tree is planted, water well. Check the original soil line one last time. If the tree does settle, now is the time to move it back to the correct position with the soil level against trunk at the same level that it was in the container. As a general rule, after the soil has settled, the uppermost large root should be just below the soil surface. Construct a basin for watering the newly planted tree, making sure that water drains away from the trunk. The basin should be slightly wider than the planting hole so that water can be applied to the entire root area and just beyond. Most of the root volume occupies a rather limited area, particularly through the first growing season, so frequent watering may be needed until the roots become established. Fill the basin once or twice a week in hot weather, less often when it is cool or rainy. Water must soak into the root ball of container-grown or bare-root trees since they cannot obtain water from the surrounding soil until their roots grow into it. Level the basin in winter so that the tree does not stand in accumulated rainwater. The ground within about 1 m of the tree trunk should be kept free of grass, weeds, or other vegetation that can compete with the tree for water and nutrients. A layer of mulch 7.5 to 15 cm thick, such as wood chips or grass cuttings helps control weeds and conserve moisture. Mulch should be kept several cm away from the trunk to minimize the occurrence of crown rot and eliminate hiding places for insect pests.

### **5.2.5 Stake if needed**

Unless the tree bends over, it will not need support from staking. If stakes are needed, place them on opposite sides of the tree, perpendicular to the direction of the prevailing wind. Stakes should be positioned outside the root ball area, but no further than the tree ties can reach. Drive stakes into soil so that the top of the stakes should be a couple of inches below the lowest main branch.

Place tree ties about 15 cm above the spot where the tree bends which will be about 2/3 to 1/2 of the way up the tree. In order to prevent ties from rubbing the tree's bark use rubber loops cut from automotive tires between the ties and the tree. Loop ties around

the tree and attach one to each stake. Ties should be loose, so that the tree can sway, and the trunk can grow stronger.

### **5.2.6 Sunburn protection at planting**

The bark of newly-planted trees is very easily damaged by too much sun; when injured, the bark is easily infested by borer insects. Protect the bark of the tree from sunburn immediately after planting by painting with white interior latex paint diluted to half strength with water. Apply the paint mixture from the soil surface up the entire trunk, including the dormant buds.

## **5.3 Pruning newly-planted trees**

### **5.3.1 Why prune fruit trees?**

- Training develops a strong tree structure that can support heavy crops without breakage.
- Training helps to bring a young tree into production at an early age.

An important goal of is to train the tree to use its resources for fruit production, not just vegetative growth. Training also maintains trees that are easier to prune, thin excessive crop to get big fruit, manage pests and harvest. Young trees are pruned to establish a strong scaffold (main branch) system of wide-angled, well-spaced branches capable of supporting large crops with a minimum of branch breakage. With older bearing trees pruning is done to:

1. Eliminate or reduce those parts/portions of the tree that tend to bear fruit of poor quality
2. Maintain suitable branch spacing to allow penetration of light and spray materials
3. Maintain desired shape, height and breadth of the tree.

See Figure 1 below for tree structure and definitions.

### **5.3.2 General rules for pruning apricot trees**

- Prune trees at planting time to balance the tops with the roots.
- Prune young trees very lightly.
- Prune mature trees more heavily, especially if they've shown little growth. Tree canopy should be kept open with considerable thinning-out in order to induce annual formation of fruit-bearing wood. Apricot fruit is borne on short spurs that are short lived.

- Prune when all danger from fall or early winter freeze has passed, but before full bloom in spring. This reduces the risk of disease and injury, however, apricots bloom very early; consequently, all or most of the flowers or young fruits are frequently killed by frost. Delaying pruning until after bloom may be advisable with apricots grown in an area that gets late frost frequently.
- Prune less heavily if there is a light or no crop at all.
- Prune the top portion of the tree more heavily than the lower portion as the top is where most vegetative growth occurs.
- Thin out more shoots toward the end of a well-pruned branch in a mature tree. This will increase fruit size and quality on the remaining shoots.

Pruning too early in the dormant season can lead to the following problems:

- Increased incidence of **Cytospora canker**, which enters the tree through pruning wounds. Pruning close to bud break when the tree starts active growth leads to rapid healing of pruning wounds
- increased internal damage
- increased sunscald of the bark



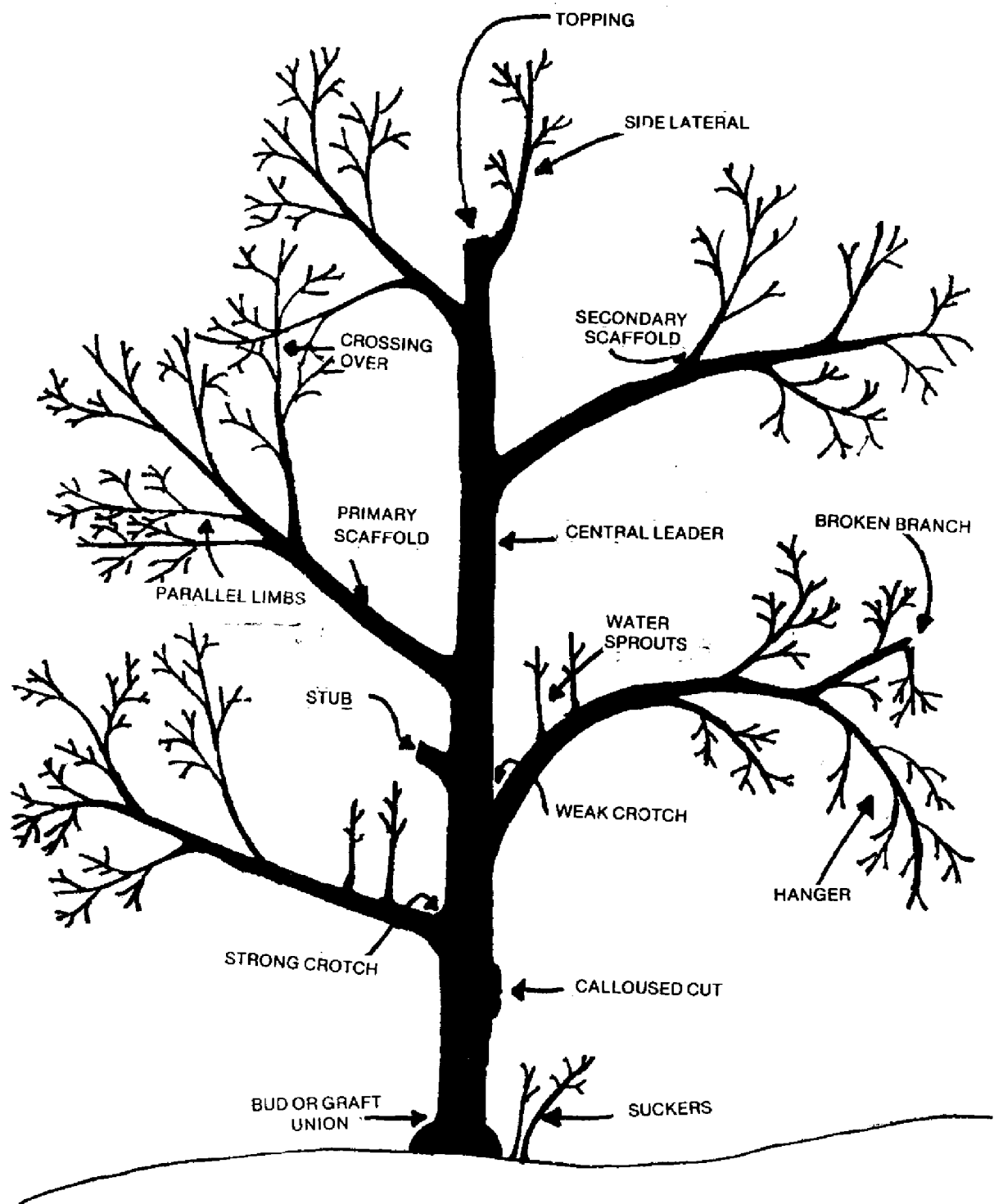


Figure 1. General fruit tree structure

### 5.3.3 Training systems

The most typical training systems for deciduous fruit trees are the central leader and the open vase or open center (Figure 2)



Figure 2. Training systems

The training system used depends on the fruit crop. Apricot grows and produces best with an open vase (open center) training system.

Types of pruning cuts: The 2 main types of pruning cuts are 'heading' or 'heading back' and 'thinning' or 'thinning out'. Trees respond differently to these cuts.

- 1) Heading cuts: Heading back is cutting the plant back to a stub, lateral bud, or small lateral branch (Figure 3). Depending on the severity of pruning, heading back results in a flush of vigorous, upright, and dense new growth from just below the cut.

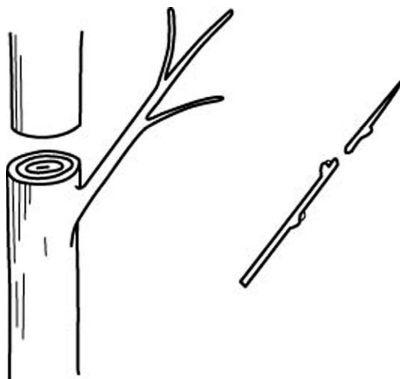


Figure 3. Heading cuts on main trunk and on side limb.

- 2) Thinning cuts: Thinning is removing a lateral branch at the bottom where it attaches or shortening a branch's length by cutting to a lateral large enough to take over the 'job' of the terminal limb (Figure 4). A woody plant responds to thinning by becoming more open but retaining its natural growth habit and does not usually produce a flush of new vigorous growth from the cut. Foliage grows more deeply into the tree

because more light can penetrate the canopy. Except when trees are newly-planted, pruning cuts should be mostly thinning cuts.

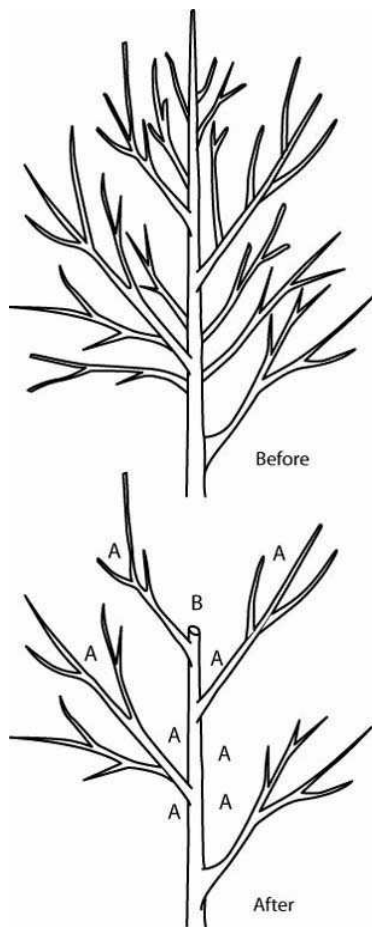


Figure 4. Thinning removes branches completely (a thinning cut made at every 'A' location), while a heading cut removes the end of a shoot (as at 'B').

#### **5.3.4 Pruning and training the newly-planted tree**

After planting and staking (if used), head the tree back by cutting the newly planted tree at knee height, about 50 to 60 cm, to force the tree to develop low branches (Figure 5). However, if desired, head the tree higher, up to 90 cm. Head back to just above a strong bud.

Small trees, those with a trunk diameter of 9.5 mm or less, usually have no lateral branches on their trunks worth saving, so remove all side branches with very small trees. Larger trees, 12.5-mm diameter or larger, often have large lateral branches along their trunks. Some of these branches can be removed completely, but a few that are well spaced vertically and radially around the trunk can be headed back, leaving 7.5-cm

outward-growing stubs with two or three lateral buds. These stubs will produce shoots that will become the main scaffold branches. If the main shoot (also called a 'leader') and the lateral branches are not headed back, very little additional branching will occur.

Heading cut removes top of small tree so tree is approximately 1 meter tall



Lateral branches are removed for very small tree, or headed back to 7-8 cm stubs with 2 to 3 buds each

Figure 5. How to prune a very small tree at planting: Heading cut and removal of laterals.

#### 5.4 Irrigating apricot trees after planting and in the first year

Newly planted bare root trees should usually not be flooded after planting if soil is heavy loam or clay and the trees have been planted during the wet dormant season. There is usually sufficient moisture in the soil for emerging roots, and flooding in a basin eliminates air spaces in heavy soils, creating anaerobic conditions that can kill trees. The tree should be basin irrigated if the soil is sandy to loam, if the clay soil is dry, or when a potted tree is planted during the growing season.

For proper growth and fruiting it is essential that trees receive water in 'on time'. To ensure adequate moisture the soil should be thoroughly wet before wilting occurs. To avoid over-watering, excess water must drain away. Alternate wetting and drying allows oxygen necessary for root growth to enter the soil.

Watering young trees is more important than fertilizing. Young trees have a limited root system, and water should be applied frequently. As a general rule, if two weeks pass without at least 2.5 cm of rainfall on recent transplants, trees should be irrigated. Even though watering may be needed for several years, watering is most critical during the first year of grove life. Young trees seldom need watering in the fall. Except in cases of extreme drought, it is better to encourage early winter dormancy by allowing the soil moisture to become low in the fall. Remove the soil basin around the tree prior to the start of the cold, rainy season.

For young trees, it is best to water twice per week, from March through June is to maintain optimum moisture in the upper soil layer where most of the roots are, especially during the crucial period of leaf expansion, bloom, fruit set and fruit enlargement –(January/February to June, usually). Soil type will affect how well the soil holds the water.

Symptoms of too much water: yellowing leaves that drop; root rot.

Symptoms of too little water: yellowing leaves that drop, drop of small fruit

## **5.5 Fertilizing apricot trees after planting and in the first year**

Fertilizing apricot trees is not recommended during the first year after planting.

# **6. Orchard management: Taking care of a mature orchard**

## **6.1 Calendar of maintenance of apricot trees**

### **6.1.1 Winter dormant season**

- Spray trees w/ dormant oil to control San Jose scale, aphid eggs, mite eggs, and peach twig borer.
- Do not use sulfur on apricots, ever.

### **6.1.2 Spring bloom season**

- Spray to control brown rot & shot hole fungus as blooms start to open. Sprays may be required @ 10-14 day intervals if weather is rainy.
- Drip irrigate daily or sprinkler irrigate Every 2-3 weeks.
- Fertilize before 1st irrigation w/ ½ to 1 kg of urea. Water in.
- Thin fruits to about 10-15 cm apart when 2-4 cm diameter.
- Paint trunks w/ 50/50 mix of white interior latex paint & water to prevent sunburn & borer infestation.

### **6.1.3 Summer growing season**

- Continue same irrigation schedule as in spring.
- Fertilize young trees monthly at 1/4 spring rates to encourage vigorous growth.

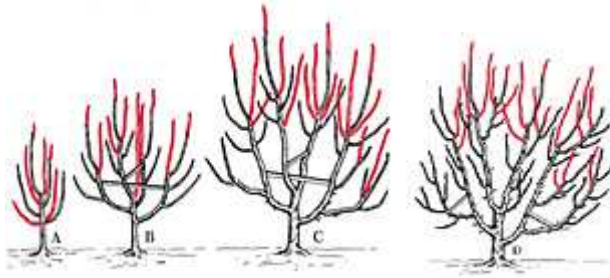
### **6.1.4 Fall harvest season**

- Prune trees before onset of winter rains to prevent *Eutypa* fungus infection of pruning wounds.
- Remove about 20% last year's growth to let light into tree.
- Remove old, broken, diseased branches.



- Spray trees during or after leaf fall but before onset of winter rains to control shot hole fungus.
- Do not use sulfur on apricots use fixed copper.

## 6.2 Pruning apricot trees Years 1 through 4



To train trees to an open center, you'll need four seasons (red indicates removed or headed shoots).

**A:** The first winter while planting the new tree, choose three or four shoots to form main scaffold branches; remove or severely head all others. Scaffold branches should be at least 20 cm apart on the trunk for a strong tree structure.

**B:** The second winter, choose one or two more.

**C:** By the third winter, scaffold selection should be complete.

**D:** The fourth winter shows a good open center. Four main scaffold limbs evenly distributed around the trunk are enough; a fifth limb crowds the other scaffolds and is not recommended.

Thinning out and heading back: Thinning-out pruning results in long, flexible limbs that bend down when loaded with fruit. Heading back or "stubbing" causes limbs to branch and stiffen to bear more fruit without breaking.

Remove all suckers: shoots arising from the rootstock or low on the scion (trunk suckers or water sprouts) or from the ground (root suckers) once a year. Remove branches that cross from one side of the tree to the other during dormant season pruning.

## 6.3 Weeds

Weed by hand frequently or with a hoe, working shallowly to prevent damage to roots.

## 6.4 Fertilizing a young and growing orchard

Maintaining a good fertilization program can keep trees vigorous and help prevent infections of bacterial blast or canker, oak root fungus, and powdery mildew.

Mineral nutrients are classified as *macronutrients* and *micronutrients*. The term "macronutrients" refers to those elements that plants require in large amounts (N, P, K, Ca, Mg, S). The term "micronutrients" (or "trace elements") applies to plant nutrients that are essential to plants but are needed only in small amounts [Fe, Zn, Mn, B, Cu, Mo, Ni (nickel), Cl (chlorine)].

Visual deficiency symptoms of N, P, K, Ca, Mg, Fe, Zn, Mn, B, Cu, and Mo (nitrogen, phosphorus, potassium, calcium, magnesium, iron, zinc, manganese, boron, copper and molybdenum) can usually be recognized by distinctive symptoms that most often occur in the leaves, but can sometimes be seen in the fruit, branches, or general growth of the tree. The most common deficiency symptoms found in apricot are nitrogen and zinc.

Types of fertilizer to use: Generally, only two types of commercial fertilizers are required: a balanced fertilizer (8-8-8, 13-13-13), and a nitrogen fertilizer such as ammonium nitrate (33-0-0), or ammonium sulfate (21-0-0). Urea (46-0-0) is a good source of nitrogen. The balanced or complete fertilizer contains nitrogen, phosphorus, and potassium, the elements needed in the largest amounts by apricot trees. The nitrogen fertilizer stimulates vegetative growth later in the year. The numbers 8-8-8 or 13-13-13 represent the percentage of nitrogen-phosphorus-potassium the fertilizer has. DAP is diammonium phosphate (18-46-0).

If soil pH is above 6.5, use ammonium sulfate (21-0-0) as the nitrogen source as it helps acidify the soil. If soil pH is 6.5 or below, use another source of nitrogen. If soil pH is above 7.5, do not apply phosphorus fertilizer. Do not ever apply sulfur directly to apricot trees.

Scatter fertilizer under the spread of branches and just beyond the dripline of the outermost branches. To prevent fertilizer burn, do not apply fertilizer closer to the trunk than 20 cm. You may apply fertilizer any time from late fall to early spring. Water thoroughly to carry the nitrogen down into the root zone. Remove competition for nutrients and water by keeping the ground bare under the tree using shallow cultivation, herbicides, or organic mulches.

Don't apply excessive amounts of fertilizer. Too much nitrogen causes excessive branch growth, inhibits fruit set, causes poor fruit color and flavor, delays ripening and may subject the tree to more severe winter injury. Also, late application of nitrogen, after mid-July, can prevent the proper "hardening off" of the tree for winter dormancy.

## **6.5 Fertilizing apricot trees that are 3 years and older**

### **6.5.1 Nitrogen**

Nitrogen should be applied annually, usually during the growing season. To improve fruit quality and color, nitrogen levels should be low but not deficient as the harvest nears. Excessive nitrogen can cause softer fruit, poor fruit color, and reduced storage and shelf life; it can also increase problems with numerous pests. Apply well away from the trunk and water thoroughly after application. Apply half to two-thirds of the fertilizer in autumn and the rest in spring.

*Rates for different nitrogen sources per tree per year (use only 1 of these):*

1. 1.4 to 2.3 kg of ammonium sulfate
2. 1 kg of urea
3. 2 to 3 kg ammonium nitrate
4. Well-rotted animal manure (e.g. poultry manure 20 to 30 kg per tree)

### **6.5.2 Potassium**

*3 year-old tree:* Apply a fertilizer containing potassium, such as muriate of potash (1 to 2 kg per tree) or a mixed N:P:K fertilizer (4 to 8 kg per tree depending on the potassium (K) content).

*4<sup>th</sup> year and older:* Halve these rates.

### **6.5.3 Phosphorus**

Dig in 10 kg of superphosphate (20 kg for trees six years and older) around the tree. Do not repeat this. OR: Use three to five leaf sprays of 0.5% (5 g per liter) of monosodium phosphate, plus a wetting agent.

### **6.5.4 Magnesium**

If trees show symptoms of Magnesium deficiency, do not apply any potassium fertilizer. Increase the amount of nitrogen fertilizer. Apply magnesium carbonate or a lime containing magnesium to tree. Spray leaves two or three times with 1% (10g per litre) magnesium nitrate or 2% magnesium sulphate plus a wetting agent.

### **6.5.5 Manganese**

Apply two or three foliar sprays containing 0.25% (2.5 g per litre) of manganese sulphate, plus a wetting agent.

### 6.5.6 Zinc

Spray with a "chelated zinc" during the growing season. Repeat if new growth still shows deficiency symptoms. Soil applications are not very effective because the roots of fruit crops occupy deep soil layers and zinc does not easily move in the soil. Although foliar sprays are more effective, foliar-absorbed Zn is not easily translocated in plants, which necessitates repeated spray applications and diminishes the ability of foliar sprays to alleviate Zn deficiency in all plant parts.

## 6.6 Recognizing nutrient deficiencies

If nitrogen is deficient, older lower leaves of fruit trees may become yellow, terminal shoot growth is reduced, and fruit yields decline since the tree may not set or carry much fruit. If nitrogen is excessive, vegetative growth may be lush, but fruit set may be reduced and fruit maturity delayed by 7 to 10 days. Therefore, either an excess or deficiency of nitrogen should be avoided. Yellow leaves of new growth usually indicate iron or zinc deficiency, and in severe cases the entire tree may be yellow.



Nitrogen-deficient peach leaves



Zinc-deficient apricot leaves

Leaves are small, narrow, closely spaced and mottled with yellow, especially new leaves. Lateral leaf buds may fail to grow. Affected trees have small new leaves.

Iron deficiency appears as yellowing between major veins of the leaf. Other deficiencies are uncommon.



Iron-deficient plum leaves

## 6.7 Irrigation

Regular irrigation is needed to grow tree fruit. Uniform soil moisture is important in maintaining tree vigor, productivity, and fruit size. It is especially important to provide the tree with adequate water during the first year after planting to help develop a good root system. Irrigate from the onset of growth in the spring through the growing season after harvest. Avoid frequent shallow irrigation. Frequent, light watering encourages a shallow root system and can cause the development of wood rot which attacks the trunks and roots, killing the tree. Less frequent and deeper watering is preferable. Irrigate your trees with a deep soaking every 7 to 15 days, depending on the season and weather.

It may be helpful to make a depression or basin around trees to collect water and aid in summer irrigation. However, excessive irrigation or excessive precipitation can create a problem with rot around the trunk collar. It is also important to level the soil surrounding the tree in the fall. This prevents water from collecting and freezing around the trunk during the winter and causing injury to the tree.

Surface irrigation by furrows and flooding (Gravity flow): Furrows should be filled with water and then drained, to ensure that the entire root system receives a sufficient amount of water. Border berms can be used to contain the water for a 1 to 2 day period for adequate absorption. Berms should then be removed until the next watering.





**Young orchard under flood irrigation**



**Flood irrigation contained by border berms**

Soil-based Scheduling Methods (How to know when to water): Irrigation should be done when about 50% of the water has been depleted from the soil. To check the water content in the soil, take a trowel, shovel, or soil tube and dig down 20 to 40 cm. A soil that has about 50% available water will feel as follows:

#### Soil texture

coarse - appears almost dry, will form a ball that does not hold shape;

loamy - forms a ball, somewhat moldable, will form a weak ribbon when squeezed between fingers, dark color;

clayey - forms a good ball, makes a ribbon an inch or so long, dark color, slightly sticky.

Mulches are beneficial to young fruit trees. Mulches of any plant material, such as shredded bark, grass clippings, straw, or sawdust conserve soil moisture, moderate extreme soil temperatures, and help reduce competition from weeds and turf. Apply a mulch 10 to 15 cm deep, but keep the mulch several inches away from the trunk.

In early fall, remove the mulch. This lets the roots know that temperatures are getting cooler and winter is on its way. The tree will begin to harden off or get physiologically ready for winter. Removing the mulch also prevents mice and other rodents from hiding in the mulch and chewing off the bark during the winter.

## **6.8 Fruit thinning**

When all factors are favorable trees can set too many fruit. An overabundance of fruit on a tree may weaken it and result in fewer buds, leading to a smaller crop for the next season. A heavy crop also can result in small-sized fruit of poor quality. To avoid these problems, thin trees two to three weeks after bloom. Remove all but the largest fruit in each cluster. Remove small, insect- or disease-injured fruit first and follow recommended average spacing distances. Fruit should be spaced by 7 to 10 cm apart

on each branch, with small branches having only 1 or 2 fruit. Thinning should be done to allow a closer spacing near the base of the branch and a wider spacing near the tip of the branch. This is done to avoid the branch bending or breaking off from too much weight at the tip.

## 6.9 Major diseases and insects and their control

### 6.9.1 Brown rot

**Brown rot** is a major disease that can infect the blossoms, fruit, spurs (flower and fruit bearing twigs), and small branches. Rain during the pre-bloom and bloom period can lead to flower infection and crop loss. Warm and humid weather conditions can lead to fruit infections causing entire crop loss on the tree or in storage. Disease prevention is essential, especially just before ripening, during, and after harvest of fruit. Typical disease symptoms are blossom and twig blight, cankers, and fruit rot.

*Blossoms:* Blossom infections reduce fruit set and cause fruit infections later in the season. Infected flowers turn brown, wither, and die. In some instances, they may become fixed to twigs as a gummy mass, in others, they may drop. Susceptibility to blossom blight is variable among the stone fruit with apricot being the most susceptible, followed by prune, sweet cherry, peach, sour cherry, and plum, respectively. Controlling blossom infections is essential to managing the development of the disease in the orchard.

*Fruits:* Brown rot infections on fruit first appear as soft brown spots which rapidly expand and are covered with powdery masses of tan colored spores. Infected fruits rot very rapidly, and shrink into a wrinkled "mummy" as it dries on the tree. Both immature and mature fruit infected with brown rot tend to remain on the tree.



Brown rot of flowers, fruit and shoots



Man  
age

ment: Applications of copper-containing fungicides at pink bud stage can help avoid serious losses. Do not apply copper compounds after bloom; after bloom use non-copper-containing fungicides. Prompt removal and destruction of fruit mummies (dried

diseased fruit) and diseased plant parts prevents the buildup of brown rot inoculum and helps keep rot below damaging levels. Prune trees to allow good ventilation. Avoid wetting blossoms, foliage, and fruit.

Pink bud stage



### 6.9.2 *Botrytis* blight or gray mold

**Botrytis blight or gray mold** is a fungus disease which can cause blight. *Botrytis* infections are favored by cool, rainy spring and summer weather usually around 15 °C. Gray mold can be particularly damaging when rainy, drizzly weather continues over several days. *Botrytis* blight can affect leaves, stems, flowers, fruit, and any other part of a plant with the exception of the roots. Treat as for Brown rot.

### 6.9.3 Bacterial Canker

**Bacterial Canker** is a disease that causes cankers (irregularly shaped, brown, water-soaked areas) that develop in the bark and outer sapwood of spurs, branches, and the tree trunk. Small cankers can develop on twigs at the base of infected buds. In the spring, amber-colored gum may ooze from the margins of cankers. In cold, wet weather, blossoms may turn brown, shrivel, and cling to the tree. Leaves also may develop dark spots that later drop out. Sunken spots may develop on young fruit.



**Management:** Avoid planting on shallow soils. Delay pruning until late winter. Caulterize pruned branches with a hand-held propane burner where disease is known to exist. If trees have been infected, remove entire affected

branches in the summer, being sure to eliminate the entire canker and a few inches below. Choice of rootstock and varieties can influence susceptibility to bacterial canker and blast. Fall or spring foliar applications of complete micronutrients (especially zinc and boron) may help prevent bacterial canker, as nutrient deficiencies make all stone fruits more susceptible. Trees stressed by nematodes are more likely to be severely damaged.

### 6.9.4 *Phytophthora* root and crown rot

Infected trees or plants often wilt and die rapidly with the first warm weather of the season. Leaves may turn dull green, yellow, or in some cases red or purplish.

Symptoms may develop first on one branch or stem then spread to the rest of the tree or plant. Darkened areas develop in the bark around the crown and upper roots. Gum or dark sap may ooze from the margins of the diseased trunk area. Reddish brown streaks or zones can be seen in the inner bark and outer layer of wood.

Management: The key factor in reducing the threat of root and crown rot is good water management. Good soil drainage is best provided before planting. Never cover the graft union with soil and do not water the crown area directly. If you suspect crown rot, carefully cut away affected bark at the soil line. Trees can sometimes be saved by removing soil from the base of the tree down to the tops of the main roots and allowing the crown tissue to dry out.

### 6.9.5 Rhizopus Rot

Rhizopus Rot is caused by *Rhizopus stolonifer*-- occurs frequently in ripe or near-ripe apricot fruits held at 20 to 25°C.

Management: Cooling the fruit and keeping them below 5°C is very effective against this fungus.

### 6.9.6 Eutypa dieback

Eutypa dieback of apricot appears more frequently in mature orchards. The first symptom is usually the rapid collapse of a branch during mid-summer. Leaves suddenly wilt and die, remaining attached to the branch. Examination of the base of the dead branch will reveal a canker surrounding a pruning wound. Most cankers produce large amounts of gum. The fungus spreads toward the trunk, eventually killing the tree. *Eutypa* has not been officially reported for apricot, however, it may appear on apricot as well as other stone fruit species and grapes.



Management: Prune late in the dormant season to promote rapid healing of wounds. Remove and burn infected wood inside the orchard and dead wood in adjacent orchards to reduce the spread of the pathogen. Cut out and remove dead limbs and trees from the orchard during dormancy. Completely remove all cankers, pruning below the canker on the limbs or trunks until no darkened canker tissue remains. Make large cuts directly after a rain because the risk for infection is lowest at this time as the atmospheric spore load has been washed out temporarily.



### 6.9.7 Aphids

Small numbers of aphids are not a concern. However, large populations cause curling, yellowing, and distortion of leaves and stunting of shoots; they can also produce large quantities of a sticky exudate known as honeydew, which often turns black with the growth of a sooty mold fungus that can damage fruit.



**Management:** Catch infestations early. Once aphid numbers are high and they have begun to distort and curl leaves, it is often hard to control them because the curled leaves shelter aphids from insecticides or natural enemies. Where aphid populations are localized on a few curled leaves or new shoots, the best control may be to prune these areas out and dispose of them. In large trees, some aphids thrive in the dense inner canopy; pruning these areas out can make the habitat less suitable. Keep the area free from weeds that can harbor aphids. High levels of nitrogen fertilizer favor aphid reproduction. Never use more nitrogen than necessary. Insecticidal soap, neem oil, and narrow-range oil (e.g., supreme or superior parafin-type oil) provide temporary control if applied to thoroughly cover infested foliage. To get thorough coverage, spray these materials with a high volume of water and target the underside of leaves as well as the top. Soaps, neem oil, and narrow range oil only kill aphids present on the day they are sprayed, so applications may need to be repeated.

### 6.9.8 Peach twig borer

Larvae bore into the growing shoots of twigs and ripening fruit or nuts. Shoots and leaves wilt and die back one to several inches from the growing tips of twigs. In fleshy fruit, injury is usually superficial. Tolerate low levels of damage.



**Management:** The most reliable control for peach twig borer is a dormant spray of spinosad or spinosad and oil, applied in winter to kill overwintering caterpillars on the tree branches. Spinosad or *Bacillus thuringiensis*, applied just as trees bloom and again a week later, also controls the pest. Avoid spraying during the growing season because it is difficult to time pesticide applications effectively. Sprays must be applied to control hatching larvae before they enter twigs or fruit.

### 6.9.9 Peachtree borer



Peachtree borer and damage near the soil line from the borer.

The adult peachtree borer is a steel blue to black clearwinged moth. Larvae are light brown or pinkish with a darker head. Damage is found primarily in the crown area or lower part of the trunk above or just below the soil line. These pests can girdle and kill a healthy young tree. Older trees are sometimes attacked but they usually tolerate the damage unless there are many larvae or a tree is attacked several years in a row.

Management: Keep trees healthy and vigorous. You can remove borers through a technique called worming during fall, winter, or early spring. Treatment of trunks with insecticides or parasitic nematodes can be effective.

### 6.9.10 Scale insects



When plants are heavily infested with scales, leaves may look wilted, turn yellow, and drop prematurely. Scales sometimes curl leaves or cause deformed blemishes or discolored halos in fruit, leaves, or twigs. Bark infested with armored scales may crack and exude gum. When numerous, some scale species weaken plants and cause them to grow slowly. Branches or other plant parts may die if they remain heavily infested with scales. If plant parts die quickly, dead brownish leaves may remain on branches, giving them a scorched appearance. Several years of severe infestations may kill young plants.

Management: If scales become too numerous, a well-timed and thorough spray using horticultural (narrow-range) oil applied either during the dormant season or soon after

scale crawlers are active in late winter to early summer should provide good control. Complete spray coverage of infested plants (such as the underside of leaves) is needed to obtain good control. Thorough spray coverage is especially critical when treating armored scales and oak pit scales, as these scales are generally less susceptible to pesticides than soft scales.

## 7. Harvest and postharvest handling

### 7.1 Maturity

Apricots for fresh consumption are picked firm-mature; firmness is a reliable indicator, as is color development.

### 7.2 Harvest method

Apricots for fresh consumption or processing are picked by hand and carefully handled. Trees are usually picked over 2-3 times each, when fruit are firm.

### 7.3 Fruit for processing

Dried apricots can be harvested later (fully ripe) than those for fresh market, and exposed to SO<sub>2</sub> (sulfur dioxide) to avoid post-harvest diseases. Sun-drying is the common method of drying apricots in Afghanistan. Canned apricots are immersed in sugar syrup. Fruit can also be made into jam or chutney.

### 7.4 Storage

Apricots when fresh have an extremely short shelf-life of only 1-2 weeks at 0°C and 90% relative humidity. They are susceptible to all post-harvest diseases (e.g., *Rhizopus* fruit rot).

**Fruit** can be canned either as whole, unpitted, whole and pitted, cut fruit or juice. jelly, jam, cream, marmalade, green apricot pickles and dried fruit pulp, apricot cake,





## 7.5 Contribution to diet

Dietary value, per 100 gram edible portion

	<b>Apricot</b>
Water (%)	85
Calories	51
Protein (%)	1.0
Fat (%)	0.2
Carbohydrates (%)	11-13
Crude Fiber (%)	2-3
% of Recommended Daily Requirement Contributed by Apricots	
Vitamin A	54
Thiamin, B1	2.1
Riboflavin, B2	2.5
Niacin	2.3
Vitamin C	22
Calcium	2.1
Phosphorus	2.9
Iron	5.0
Sodium	---
Potassium	6.0

Apricots are high in fiber and vitamins and are especially good sources of vitamin A and vitamin C. Three small fresh apricots contain more than 50% of the recommended daily intake (RDA) of beta-carotene, a potent antioxidant. Beta-carotene prevents the build-up of plaque deposits in the arteries, protects the eyes from sun damage and deactivates free radicals that, if left unchecked, accelerate the ageing process and increase the risk of cancer. In addition, the body converts beta-carotene into vitamin A, which is vital for good vision and for keeping the eyes lubricated. Those at risk of dry eyes should include plenty of apricots in their diet. Apricots contain significant levels of iron, essential for hemoglobin, the oxygen-carrying pigment in red blood cells.

## 7.6 Other uses for apricots

**Seed kernels** can be pressed for apricot seed oil after grinding. The oil can be used in high quality soap (Amandine soap) and toiletries manufacture or as an ingredient in human and feed animal foods (as 'press-cake'). The aromatic essences can be extracted and used in foods and toiletries. Seeds or kernels of the apricot grown in central Asia and around the Mediterranean are so sweet that they may be substituted for almonds. The Italian liqueur Amaretto and amaretti biscotti are flavoured with extract of apricot kernels rather than almonds. Oil pressed from these cultivars has been used as cooking oil.

**Seed hulls** can be ground and used in

- toiletries (exfoliants)
- abrasives in commercial applications: filler for polymers, in polishing-creams, abrasive for cleaning delicate wood and metal surfaces, dental abrasive
- can be burned at high heat and used as fuel or activated charcoal.



## **8. Cover Crops**

### **8.1 Should the grower plant a second crop for income?**

Cover crops are sometimes planted in apricot orchards; in some cases other agronomic row (vegetable, fruit), forage or grain crops may be interplanted in orchards. However, other plants will compete with apricot trees for water and nutrients, reducing yields, fruit size and tree size. Use of a cover crop, such as clover or other legumes, however, can be of benefit if the cover crop is disked under (incorporated into the soil) at the end of the rainy season before water becomes a limited resource. This practice increases soil fertility and soil structure. Cover crops, like weeds, can increase the possibility of frost damage.

### **8.2 Why plant a cover crop?**

- Cover crops can provide a source of income during the establishment period of an orchard before fruit is produced.
- improved soil tilth
- increased water infiltration (winter-growing annuals will not use water the trees need and may increase the amount of soil moisture)
- better soil fertility (barley, oats, triticale, legumes)
- weed control
- reduced soil erosion.
- Some cover crops, when used in rotation (different cover crop planted each year) can help control soil nematodes. Good cover crops to use for nematode control include: rotations of cover crops such as sudangrass, mustard, vetch, and cowpeas.
- Sandy soil will support a cover crop such as barley or rye better than oats

### **8.3 Disadvantages of cover crops should also be considered**

- Cover crops can increase the danger of frost damage to newly emerging leaves and blossoms of trees when the crop is tall and dense.
  - To reduce the risk of frost damage, plant a low-growing cover crop, but not grasses which can harbor frost-causing bacteria that can move into the trees.
- A dense spring cover crop may a lush spring cover crop may lead to extra brown rot, shot hole, rust, mildew, and other fungal diseases, especially when the crop is tall (such as tall grains and legumes—for example, faba bean).
- Summer cover crops can increase nematode numbers. Perennial crops like clovers can use too much water in the summer. Plant a winter annual crop.

## **8.4 Recommendations**

- When soil pH is above 8.0 plant barley, medics, fescues, trefoil, strawberry clover, and other alkaline-adapted plants.
- Winter cover crop can be tilled into the soil to improve soil tilth, nutrition and water penetration
- For improved soil nitrogen, plant legumes, such as vetch, peas, bell beans, clovers, medics, and cowpeas
- In order to benefit the soil, the cover crop must be mowed or disced into the soil. Harvest the part of the plant that can be sold and turn the rest of the plant into the soil to fertilize and improve the soil.

**Table 1. Rootstocks used for apricot in Afghanistan: Their advantages and problems.**

Rootstock	Common name/variety	Preferred application/advantages to use	Problems
<i>P. armeniaca</i> .	apricot seedlings and commercial varieties	well-drained soils, low temperature tolerant, frost hardy; good productivity, resistant to nematodes, doesn't sucker	heavy, wet, alkaline or saline soils, excess vigor; genetic weaknesses in selfed cultivars, nonprecocious, susceptible to <i>Armillaria</i> , <i>Pseudomonas</i>
<i>P. cerasifera</i> , <i>P. myrobalana</i>	cherry plum, myrobalan seedlings and clones	physical resistance to stemborer; wide soil adaptation; improve winter hardiness with high-budding; advance harvest; Ademir variety plum rootstock reduces vigor, adaptive to heavy and calcareous soils, resistant to iron chlorosis and root asphyxia	low yield, nonuniform and nonvigorous growth, incompatibility, suckers, susceptible to <i>Pseudomonas</i>
<i>P. cerasifera</i> x <i>P. munsoniana</i>	wild-goose plum; GF 8-1, Marianna 2624	wide soil adaptation, vigorous and productive; resistant to water-logging and pests; improved productivity; used on shallow and saline soils, resistant to <i>Meloidogne incognita</i> nematode; <i>Armillaria</i> tolerance	limited compatibility, susceptible to <i>Pseudomonas</i> . and <i>Pratylenchus vulnus</i>
<i>P. domestica</i> L.	European plum	good compatibility with some cultivars, vegetatively propagated, adjustable budding height; improve longevity and cropping; improve winter hardiness with high-budding	heavy soils, water logging, suckers
<i>P. persica</i> L (Batsch.)	peach, Lovell, Nemaguard, Nemared	good vigor, good compatibility with local cultivars; some resistance to bacterial canker and Verticillium; Nemaguard & Nemared have root-knot nematode resistance; improved productivity; doesn't sucker	some incompatibility, slow vegetative growth, low productivity, heavy or alkaline soils, sensitive to crown-gall and <i>Phytophthora</i>