

Cultivation of fruit and nut trees.

Nut and Fruit trees are a good option for commercial agriculture in Nepal

Vibrant forests once covered the valleys and hillsides of Nepal....lapshi, champaka, bar-pipal, sal, winter cherry, wild peach, wild pear, apricots and many more. Over the centuries much of the forest cover has been removed for construction of homes, temples, and palaces or replaced with fields of grains and other field crops. The various ecosystems of Nepal...from the tropical Terai to the tree-lines of the Himalaya.... provide appropriate locations for any tree.

Now is a good time for Nepali landowners to consider some new opportunities for commercial agriculture. Many young men and some women are working in other countries, diminishing the labor force in the Nepal countryside but at the same time inviting opportunities for enriching the land with trees. Field crops and vegetables demand regular labor but high value nut and fruit trees can be grown with minimum labor.

Rural Nepalis are looking for ways to remain on their family lands yet enjoy a richer life. With roads providing easier access to supplies and markets, with internet and phones providing increased information, now is the time to consider income-generating possibilities. Coffee, tea, cardamom and turmeric are good examples of already successful crops for local and export markets.

Fruits and Nuts as Low-labor, High-value Crops

Nepal imports more than 95% of nuts and fruits sold in the domestic market. Apples, pears, pomegranate, grapes, mangoes, bananas, pineapple, come from China or India. Almonds, walnuts and pistachios are imported from other Asian countries and California. All of these can be grown within one or more of Nepal's diverse ecosystems. We know that macadamia and pecan nuts are successful within the Kathmandu Valley (there are at least ten 30 year old productive pecan trees in Kathmandu), but so far are not being grown commercially. All nuts sell at 1200 or more Rs per kg. Nuts are particularly attractive for rural areas of Nepal as they can be harvested, sorted and packaged in the villages and stored and

shipped when market prices are favorable, unlike vegetables and fruits. Nuts are nutritious, high-value, and easy to store and ship.

The value of organic.

Besides the high market values of fruits and nuts, the value of organic needs to be considered. People world-wide are becoming aware of the health hazards of chemical foods. Many countries are limiting the use of chemical fertilizers and pesticides as well as GMOs. Nepalis are more aware of cancer, asthma, birth defects and infertility resulting from misuse and consumption of chemicals. NG pesticide-residue testing at Kalimati has shown that 100% of produce contain some level of pesticide residues. Besides the health hazards of chemical production, organic is now higher value on the international market; this trend will continue for some years. (Compare prices of turmeric and organic turmeric.)

Our research at EVON is indicating that chemical fertilizers and pesticides are unnecessary. In fact, long-term use of chemical inputs degrades the entire ecosystem. Soil, water, and air contamination destroys soil life from microbial forms to worms, fish, snakes and bees. Many alternatives to chemical approaches such as biodynamics, biointensive, permaculture and many other variations of organic have shown that enhancing natural ways is superior to attempts to kill all threats. Sikkim and Bhutan are now hoping to reach all-organic states in the near future. Nepal can do the same. When the world searches for organic foods, let the Himalaya provide.

How to cultivate trees?

I. Proper preparation increases success and diminishes losses

Growing trees is not complicated, but like all farming you cannot just put them in the ground and ignore them. You need to be trained in how trees grow, how and where to plant them, how much water and fertilizer they require, how to prune them and how to manage insect and disease problems. We have talked to many tree farmers whose trees died because made small mistakes like planting grafted trees too deep or not providing good water drainage.

1. Choice of land: Most farmers have inherited their land from their forefathers. When you think about planting trees, consider aspect, elevation, rainfall, availability of water, distance to markets, neighbors, social situation.

2. Find good quality trees: Finding good quality trees is like a treasure hunt. While buying trees, look for good structure, strong roots, healthy buds and branching. Match the tree to your ecosystem.

Sources: NG horticultural farms for established varieties e.g. suntala, walnut, pecan, nashpati, grape. Contact the government farm in your area to make advance orders for trees

3. Select trees that will grow in your area i.e. appropriate elevation and climate.

4. Research potential markets and prices. Select trees with good market prospects. (Before planting 1000 kiwi, make sure there's a market.)

5. Choose an appropriate site:

Select the best site for sun, wind, water, etc. Good drainage is essential for all trees; many will die from root rot if there is not good drainage.

6. Keep correct distance between trees. Usually 18 – 25 ft. Plant on triangulation plan for most efficient use of space.

7. Some trees are self-fertile, meaning that they can produce fruit or nuts without another tree. Other trees require another pollinator tree.

8. Planting the tree: Remember that the tree will remain in the same place for many years therefore invest time and energy in planting correctly (see below).

9. Proper time to plant trees:

Transplanting trees is stressful.....for the tree and maybe for you. Try to reduce the stress as much as possible. Deciduous trees (apples, walnuts, pecans, peach, pear, almond) should be planted when dormant generally from December to February when all leaves have fallen. December (Mangsir-pus) is best as the roots can settle in and adjust before the sap flows in spring. Evergreen trees (avocado, citrus, conifers, macadamia, coffee, olive) should be planted during the monsoon when they can adjust more easily with continual rain.

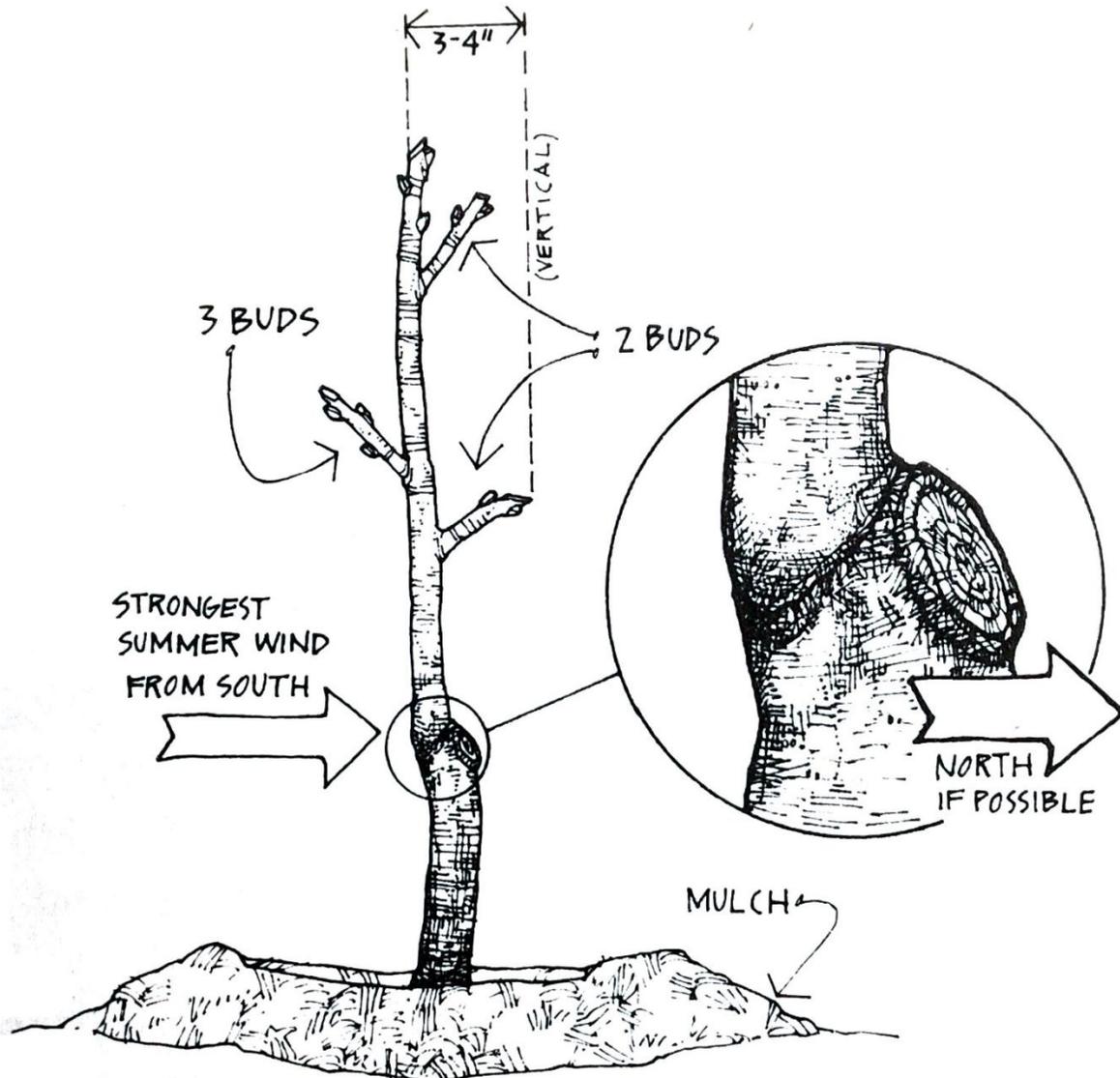
Consider the place from which the tree is brought. Is the weather ok for digging and transportation? Will Nepali holidays interfere with immediate planting? Will modes of transportation destroy the trees en route? It's very important that, if sent long distances, bare-root trees are well-protected for the journey so no roots are dried or lost en route. (Remove trees from original place by digging from the outer periphery of root system and removing a large ball of soil. Gently remove soil from roots and immediately wrap the roots in forest mosses and wrapping burlap sack to prevent loss of moisture.) Places to plant the trees, whether in temporary nursery beds or in permanent orchard areas, should be prepared before the trees arrive so that trees can be planted immediately, avoiding stress. If they cannot be planted immediately, dig a trench a foot deep and lay the tree roots into it with the tree at a slight angle, cover the roots with soil and water.

Process of planting a tree.

1. Dig a hole about 3 feet in diameter and 3 feet deep. Remove all large rocks and extremely poor soil. Sheet compost dry carbonaceous materials alternating with nitrogenous materials to a depth of one foot. Cover these rough materials with good soil from the site amended with one k.g. of ashes, one k.g. of bonemeal, one doko (40 k.g.) basket of compost and one k.g. of pina(mustard cake).
2. Prepare a mound for the tree in the center of the hole so that roots can be opened carefully and arranged over the mound.

3. Remove tree from plastic sheath, pot or bareroot wrapping. Open up the root system carefully and remove any dead or damaged roots with scissors.

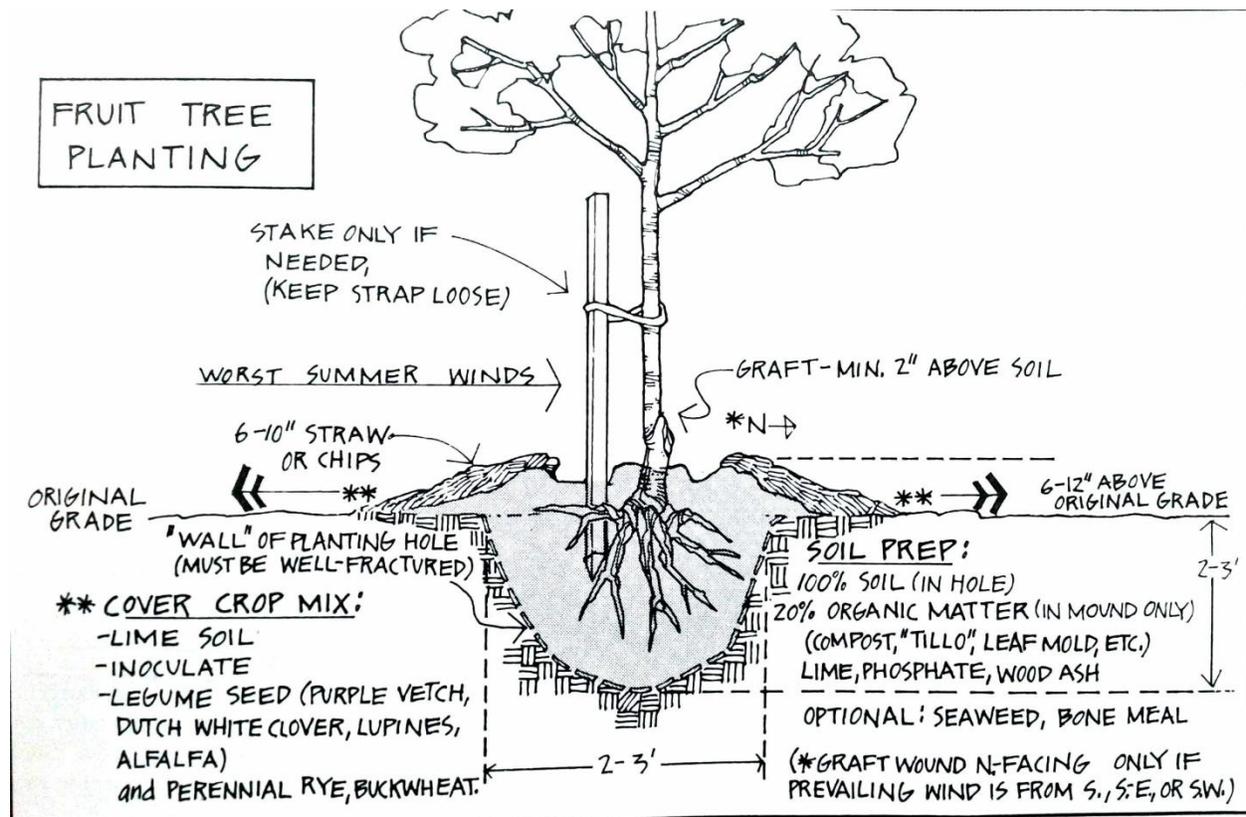
4. Arrange the roots around the inner mound so that they radiate out evenly in all directions. Arrange so graft is on opposite side of strong winds.



5. Cover the roots with 2-3 inches of plain topsoil. Roots can burn if you use compost or enriched soil.

6. Fill the hole completely so that soil covers the tree trunk as it did in the nursery, with soil filled up to half the distance between the top of the root stock and the graft.

7. Make a ditch around the periphery of the tree at ground level for watering. This ditch should be maintained during the dry seasons in order to water periodically. If planted during the monsoon season, provide a ditch out of the circle for drainage. One of the main reasons that trees die is root rot because of insufficient drainage. Avocadoes are especially susceptible to rootrot so always plant in a very-well drained situation or on the top of a high mound of soil.



8 At the time of planting, prune to a central leader system.

For fruit and nut trees, there are two basic forms, open vase shape or central leader. Central leader is recommended for most fruit trees and all nut trees.

Vase shape tends to create a central bowl between the branches as they enlarge over the years, making it susceptible to fungal diseases, especially in monsoon climates. EVON recommends the central leader system.

At the time of planting, prune to create basic structure: 1-2-3-4 design.

During dormant season, examine structure and prune to reinforce basic structure and encourage spur development. Remove all dead, diseased or injured growth. Remove all vertical shoots and those close to main trunk. Prune any branches longer than tip of main trunk growth. Prune back to bud on downside of branch in direction of branch growth. Check for gummosis. See plant protection section for treatment.

6. Maintenance:

Fertilize with bonemeal and compost in the early winter and mulch from one handspan out to beyond dripline. Fine feeder roots are at dripline and beyond.

If trees are susceptible to aphids, spray with dormant oil spray as soon as leaves drop in the fall, again mid-winter and again just before tree leafs out in the spring. Use mustard oil mixture of 1:10 mixing with 100 grams of Nepali gola soap or liquid dish soap. See plant protection section for treatment.

7. Watch for disease and insect problems during spring and monsoon. Watch for root rot and treat immediately with copper sulphate/lime mixture called Bordeaux mixture as follows: *soak 100 gm of copper sulphate in plastic bucket 3-4 hours before spraying. After it is completely dissolved add water to make the final volume 5 litre. In another plastic bucket mix 100gm of lime into 5 liters of water. Now mix the liquid from both buckets. Dip any non rusted metal object for 5 minutes. if any rust appears there then add lime and stir spontaneously. If you get bluish water falling from the tip of the metal then it is ready for use. It should be used within 24 hours.* Watch for gummosis on cherries, peaches, plums and apricots. Cut out damaged wood and apply gobar goop.

8. When fruiting begins, thin clusters of pears, apples, peaches, plums to two fruits per spur in order to create larger, flavorful fruit. Prune leaves above grape clusters to insure sufficient sunlight and air circulation, improving flavor.

9. Maintenance Pruning: Before beginning pruning of fruit or nut trees, procure a good saw and secateur. **Do not try to prune with axes or Nepali tools. Injury leads to disease.**

Tools are available at agrovet stores. Cheapest is Indian clipper (secateurs) and it's ok. Best ones are Japanese or Swiss but very expensive.

Pruning practices:

There are mainly two designs of trees one vase shape and one central leader. A combination of the two is also practical. If one is planting large trees for permanent location, the central leader approach is advised. For walnut, pecan or other large nut trees, select branches every one foot or more along the vertical trunk, branches pointing in 90 degree separation from the previous.

Repeat the sequence once or twice as the tree grows. Prune out all other branches, prune back all vertical growth from branches and prune length of branch to be less than leader.

Maintenance:

Trees require much less attention than vegetables or field crops. However, regular observation of your orchard trees is recommended.

What to observe:

Is the soil too dry or too wet? During the dry season, build up a small moat around the tree trunk at the outer extent of the branches. Water in this moat. Soak thoroughly once a month during the dry season. Starting in February, water with compost water or other nutrient liquid.

Are there weeds or other plants within the circle? Remove and add them to mulch.

Check the trunk and under leaves for insects or disease. Look in crotch and base of trees for gummosis or signs of rootrot. See plant protection for treatment.

Watch for aphids on peach family during fruit budding. Spray with strong pressure of water when first appearing. Spray with dormant oil spray if buds are not open.

Look for borer holes near base of tree or in angles of branches.

Shake walnut, cherry and other trees susceptible to kumray scarab beetles. Collect in bucket of water mixed with bit of mustard oil. Dispatch in most compassionate way.