Agroforestry Third stage

Forestry Department

**3- Forest farming**

In forest farming, high-value specialty crops are cultivated under the protection of a forest canopy that has been modified and managed to provide the appropriate conditions. It is a way of utilizing forests for short-term income while high-quality trees are being grown for wood products. The amount of light in the stands is altered by thinning, pruning, or adding trees; 5-40% crown cover is usually desirable. Existing stands of trees can be intercropped with annual, perennial, or woody plants.

[Forest farming](http://en.wikipedia.org/wiki/Forest_farming), also known as 'shade systems', is the sustainable, integrated cultivation of both timber and non-timber forest products in a forest setting. Successful forest farming operations produce: mushrooms and birch syrup, native plants used for landscaping and floral greenery, medicinal and pharmaceutical products, wild berries and fruit.

**The main categories of specialty crops are:**

**FOODS:**

* Mushrooms
* Nuts, e.g. hazelnuts, small chestnut species; note that the canopy trees could also be nut producers, e.g. walnuts, chestnuts, pecans, pine nuts
* Vegetables, e.g. radish, beetroot
* Honey from bee plants
* Herbs, e.g. mints
* Fruits, e.g. blueberries, strawberries
* Edible flowers

**Benefits:**

1- Economic benefits can be significant. Logs can produce shiitake mushrooms worth 5-10 times the value of the logs themselves. Other medicinal plants provide a lower but steady supplemental income. Markets for floral decorative have been steadily increasing.

2- Forest farming modifies the forest ecosystem, soil erosion control, microclimate moderation, and wildlife habitat.

3- Forest farming provides opportunities to generate short-term income from existing woodlands, with minimum capital investment. Especially on small family farms, this can contribute significantly to diversification and rural economic development.

**Drawbacks:**

1- Requires more of an entrepreneurial attitude from farmers and landowners.

2- Likely to need to conduct research to locate potential buyers of specialty products.

**4- Windbreaks and Shelterbelts**

**Windbreak** is rows of trees around farms and fields planted and managed as part of crop or livestock operations to protect crops, animals, and soil from natural hazards including wind, excessive rain, or floods.

**Benefits**

The main reason of windbreaks are widely used is their ability to serve one purpose, while at the same time provide additional varied benefits.

* Protect soil, crops and livestock
* Modification of microclimate of the protected zone by decreasing wind velocity
* Humidity is increased behind windbreaks
* Increase crop production in areas protected by windbreaks
* Also, positive impact on animal production
* Provide wildlife habitat

**Windbreaks components**

* **Height** of the windbreak, often referred to as H, is an important factor determining how far downwind the protected zone will reach. This value increases as the windbreak matures. The greatest wind speed reduction occurs in the area from two times (2H) to ten times (10H) the height of the windbreak on the leeward, or downwind, side.

Measurable reductions can also occur as far away as thirty times the height. For example, for a windbreak where the tallest trees are 30 feet, the greatest wind speed reductions will occur from 60 feet to 300 feet leeward of the windbreak.

* **Density** is the amount of leaves, branches and trunks in the windbreak. Wind blows over and around a windbreak but a portion also flows through the windbreak.

The more solid or dense a windbreak, greater the wind speed reduction. However, less dense planting allows for protection to a greater distance. The density can be managed by the choice of species, conifer versus deciduous, the spacing of the trees, and the number of rows in the windbreak.

* **Orientation** is the direction the windbreak faces. Windbreaks are most effective when oriented at right angles to the troublesome winds. To allow for changes in wind direction, windbreaks are often planted in multiple directions such as an L, U, or E shape. When orienting the windbreak, avoid placement that may cause future management problems such as interference with utilities or road visibility.
* **Continuity** of the windbreak is essential to achieve full effectiveness. Windbreaks should not have any large gaps. Gaps create a funnel effect that concentrates wind flow, increasing wind speed in excess of those in the open field often causing damage downwind from the gap.

Replacing trees that die and locating access lanes around the ends of the windbreak can prevent gaps. If roads, lanes, or a large ditch must cross a windbreak, try to make the crossing at an angle to the prevailing wind direction. The goal is for the trees and shrubs to grow together to form a continuous barrier within ten years.

* **Length** of the windbreak determines the amount of total area receiving protection. For best protection, the uninterrupted length of a windbreak should exceed the height by at least 10:1. For example, if the height of the windbreak is 30 feet, the windbreak needs to be at least 300 feet long to minimize the impact of air turbulence around the end of the windbreak.

**Design of windbreaks**

* Most efficient: narrow (3 - 4 rows of trees planted at moderate density), angle of 90° to the predominant wind direction
* Distance between windbreaks 10 - 25 H
* Type of trees and shrubs – dense crowns, stout boles, retention to lower limbs, uniform rate of growth
* Broadleaved (crops) vs. conifers (livestock)
* Mix of the species
* Extra care during establishment

**The most commonly used windbreak tree species**

For best results, both conifers and broad-leaf species are grown together in windbreaks.

In Kurdistan region of Iraq widely species used for windbreaks are:

**Pine** (*Pinus brutia*)

**Cypress** (*Cupressuss empervirens*var. *pyramidalis and horizontalis)*

**Eucalyptus** (*Eucalyptus camaldulensis*)

**Walnut** (*Juglansregia*)

**Poplar** (*Populusalba*)

**Willow** (*Salix alba*)

**Sycamore** (*Platanus orientalis*)

**Horsetail** (*Casuarina equisetifolia)*

**Chinaberry** *(Melia azedarach)*

**Mulberry** *(Morus alba)*