

# Ectomycorrhizal Mushrooms and Associated Trees

An ectomycorrhiza ("outside", "fungus", "root"; plural ectomycorrhizas or ectomycorrhizae, abbreviated EcM) is a form of mutualistic (beneficial symbiotic) relationship that occurs between a fungus and the roots of various plant species. Ectomycorrhizas form between fungi and the roots of around 2% of plant species. These tend to be composed of woody plants. The major ectomycorrhizal tree in the Chicago Region is oak (*Quercus*). There are more than 470 ectomycorrhizal mushrooms in the Chicago Region.

## Ectomycorrhizal mushrooms include:

- Boletes and relatives, *Paxillus*, *Scleroderma*, *Astraeus*
- Gilled mushrooms: *Amanita*, *Cortinarius*, *Entoloma*, *Hygrophorus*, *Inocybe*, *Laccaria*, *Lactarius*, *Russula*, *Tricholoma*
- *Cantharellus*, *Craterellus*, *Thelephora*
- Tooth fungi: *Hydnum*, *Hydnellum*, *Sarcodon*, *Phellodon*
- Some corals: *Ramaria*, *Clavulina*
- Truffles (*Tuber*) and false truffles (*Rhizopogon*)
- *Morchella* are their own category of "mycorrhizae"

For a full list see: <https://mycorrhizas.info/ecmf.html#list>

## Ectomycorrhizal trees and shrubs include:

- Pine, Fir, Spruce, Larch, Hemlock, Douglas Fir (Pinaceae)
- Oak, Beech, Chestnut (Fagaceae)
- Birch, Alder, Hazel, American Hornbeam, Hop-hornbeam (Betulaceae)
- Poplar, Cottonwood, Willow (Salicaceae)

To a lesser extent:

- Basswood (Tiliaceae)
- Hickory (Juglandaceae)
- Blueberry family (Ericaceae)
- Elsewhere in world : Southern Beech, Eucalyptus, Legumes, others

For a full list see: <https://mycorrhizas.info/ecm.html#hosts>

Nitrogen is a crucial component of plant biochemistry, being part of chlorophyll, enzymes and amino acids. However, in the majority of terrestrial ecosystems, it is a limiting nutrient, and readily available nitrogen is in short supply compared to the recalcitrant organic forms that are often shielded from rapid breakdown. Thus, the formation of ectomycorrhizal associations offers an extremely beneficial solution by allowing for the greater exploratory capacity of fungal hyphae, as well as the more efficient acquisition of nitrogen from reserves contained in the organic horizon.

Ectomycorrhizae also assist with water uptake and protect the roots against pathogens.

## Leaf Orientation

Opposite



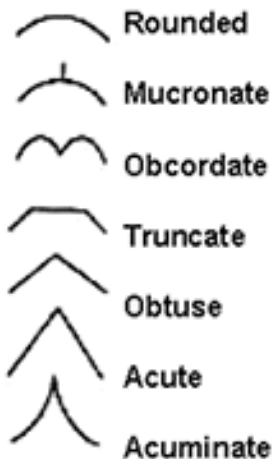
Alternate



Whorled



## Leaf Tip

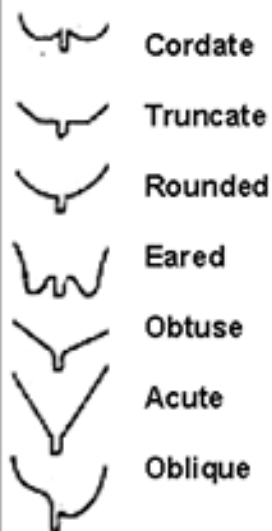


## Shape of Leaf Blades

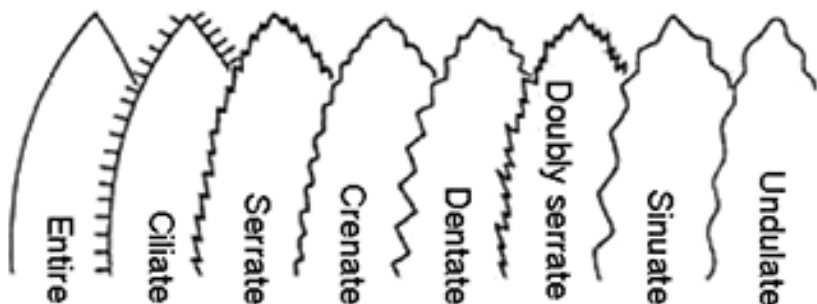


Graphic taken from [www.eeob.iastate.edu](http://www.eeob.iastate.edu)

## Leaf Base



## Shape of Leaf Margins



Pinnately veined  
Pinnately lobed



Palmately veined  
Palmately lobed