WHAT IS MYCORRHIZA AND WHAT DOES IT DO?

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Mycorrhiza is the association of the mycelium of various fungi and the roots of seed plants. Mycorrhiza can form in many shapes and colors. Formations sometimes look like a mantel of light gray or gray brown texture and are often mistaken for common molds.

The importance of mycorrhizae for seedling growth has been recognized and evaluated all over the world during the last 30 years. In West Australia, the Philippines, Sumatra, Rhodesia, Sweden, and some parts of North America, it has been very difficult to grow coniferous seedlings on certain soils, unless the soil was inoculated with soil or humus from areas that supported a stand of coniferous trees.

Several attempts to reforest certain areas in North America have been very discouraging. Some of the reasons are unsuitable planting stock, poor ground preparation, drought, damages from rodents and disease. An important factor that receives too little attention is mycorrhizal relationships.

It is not uncommon that on unfertile soil some unthrifty, old pine seedling, only a few feet high, will have a root system about 8 yards in length. On the other hand, a pine seedling of the same height, but on fertile soil, will have a root system of only 1 foot. On mediocre and relatively poor soils, forest trees normally live in symbiosis with mycorrhizal fungi (phosphatides) that aid in the uptake of nutrients from the soil.

Where mycorrhizae-bearing pine seedlings have been planted into sterile peat of of low phosphorous content with mycorrhizae-free plants of equal sizes, the former have grown to double the size of the latter one summer. This seems to show that plants with mycorrhizae are more readily able to utilize soil with a low phosphorous content than are plants without mycorrhizae.

Substances[1] produced by certain plant organs (e.g., the germinating seeds of pine and spruce), have a stimulating effect on mycorrhizal fungi. Mycorrhizal fungi are very largely dependent on a supply of growth substances, especially thiamin (B-1), produced in the soil by green plants and liberated when litter is decomposed. Isolated free roots are dependent for growth on certain substances produced by the mycorrhizae (B-indolyl acetic acid).

More direct evidence of the beneficial effect of mycorrhizae has been observed in recent years in nurseries where, under certain conditions, direct comparison of the growth of coniferous seedlings with and without mycorrhizal infections has been possible. Formation of mycorrhizae has been induced by direct inoculation of the soil with mycorrhizal fungi or by the addition of infected soil from a vigorous stand of the same species; seedlings have subsequently become healthier in appearance (fig. 1). These observations have been made especially on soils which were thought to be devoid of suitable mycorrhizal fungi, or deficient in some essential nutrient.

Production of quality sugar pine planting stock at the Mount Shasta Nursery in California was not successful until the soil had been inoculated with soil from under a mature sugar pine stand. Just prior to sowing of sugar pine seed, a thin layer of humus was sprinkled over the seedbed area and mixed in with the topsoil. The small seedlings were fertilized with a water soluble fertilizer composed of 16-20-0. The result of these treatments was that at the end of the first growing season, the seedlings made satisfactory growth and had a well-developed root system; evidence of mycorrhizae was noticeable on all the plants. However, it has not been ascertained whether mycorrhizal fungi were actually absent in the soil or, if present, were unable to form mycorrhizae.

[1]Mushrooms, toadstools, etc. (these aid and change the roots of the seedlings to mycorrhizae).

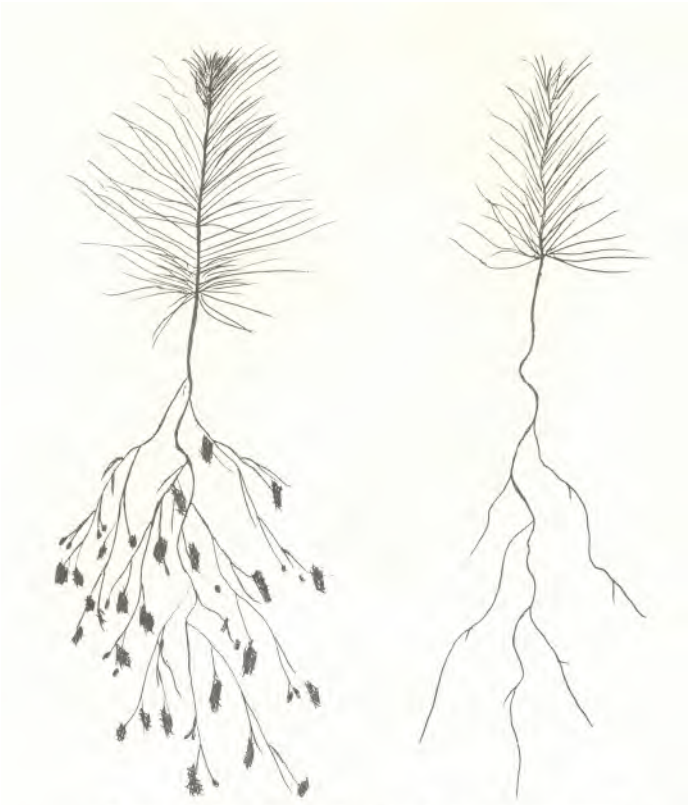

Figure 1.--Pine seedlings with and without mycorrhizae.

Recent investigations have revealed that mycorrhizae have been present in the soil even on clearings 60 years old. However, they might be in an inactive state. Mycorrhizae do not form or develop when the pH is over 6. The ideal pH for development of mycorrhizae is 4.5 to 5. It must be remembered, however, that all forest planting implies a strain on the nutrition balance of the seedlings when these are transferred from one environment to another.