July-August Newsletter
Triangle Bonsai Society

NEXT MEETING

SUNDAY August 5, 2018 Carving, Jin and Shari

1:30 PM - 4 PM

CLUB MEETING location:

Agric Extension Bldg 4001-E Carya Dr Raleigh, NC 27610

Next Beginner Workshop

SATURDAY August 25th - Beginner class 9AM - NOON at Normal club meeting location (4001 E Carya Drive, Raleigh NC 27610) all club members welcome (free)

Letter from the President

Thanks to all for a wonderful TBS Bonsai Expo. I just wanted to take a moment to thank each and every person who helped make our 2018 TBS Bonsai Expo at Sarah P Duke Gardens such a great event. Based on the feedback that I received from both the attendees and the folks at Duke Gardens, it was very well received and enjoyed by all. I very much appreciate the fact that such a successful show is only possible through the effort of many people working together – before, during and after the show.I first want to

thank all of our members who prepared trees to display in the show. Without your efforts and willingness to share your gift and your passion for bonsai, the show would just not be possible.

There was a very nice representation from a wide scope of members this year and I think that makes our show very special. It is a show that represents our club as a whole and having that variety of trees in different stages of development shows the public the progression of the art and (as our signs at the show said) “Bonsai is for Everyone”.I also wanted to thank the many volunteers that literally made the show come to life. From the many folks who volunteered to be docents and did such a nice job interacting with the public, to everyone who helped set up and brake down the tables, chairs and display areas.

Thanks also to Gabriele Monetti, Michael Markoff and Harold Johnson for conducting the bonsai demonstrations. The demos are always some of the highlights of the show and another great way to help demystify the art for some of those attending the show.I also wanted to thank Jim Easterbrook. Jim was kind enough to set up a station at the show this year, where members could bring their trees in for a check up and some advice and help on how to develop the tree.

A special thanks also goes out to Mr. Joe Noga for all of his hard work. For those of you who may not know, Joe is the foremost bonsai photographer in the world today and we are very fortunate to have him in our club. He was so very kind to transport and set up an entire photography studio at Duke Gardens to create a professional photograph of each bonsai in the show. This will not only provide a visual record for each of the show participants, but will also provide each artist with a valuable tool to reference back to as they continue to develop those trees in the years to come. This, in addition to displaying several trees in the show - one of which won the People’s Choice award (his wonderful Crab Apple tee). Congratulations Joe.

And most of all, I want to thank Merritt Barnett, who did a wonderful job organizing the entire show and working closely with Gabriele Monetti and the many participants - bringing everything together to run so smoothly. That is no simple task and all of TBS has Merritt to thank for that.So, in conclusion, thanks again to all. I sincerely understand how valuable your time is and I can’t begin to tell you how much I appreciate your willingness to give TBS some of that time to help share bonsai with the public through our outreach programs – like this wonderful Expo. Keep enjoying your bonsai and sharing that enjoyment with others. Very well done.

Ken Hallatt
President, Triangle Bonsai Society

People's Choice Award .
Crabapple

From our VP- Program chair Gabriele Monetti

Our second annual show at Duke Gardens was yet again a resounding success. Hundreds of visitors enjoyed a beautiful display of quality bonsai from several members of all levels of expertise. All four demos were very well attended and received excellent feedback. Our very own Joe Noga spent the entire day Saturday photographing every bonsai with his usual high degree of skill and attention to detail; watching him work is always a treat!

One of Joe's tree, a spectacular crabapple, was also the recipient of the most votes for people choice, closely followed by a magnificent hinoki cypress forest created by Ed Lauer. The third most votes went to Joe's amazing "upside down" japanese maple, a true horticultural and stylistic feat. It was a treat for me to see that tree up close, after admiring it on the pages of International Bonsai.

Last, but not least, the staff at DG was as gracious and helpful as always; they were amazed at how quickly we disassembled the show at 4 PM on Sunday.

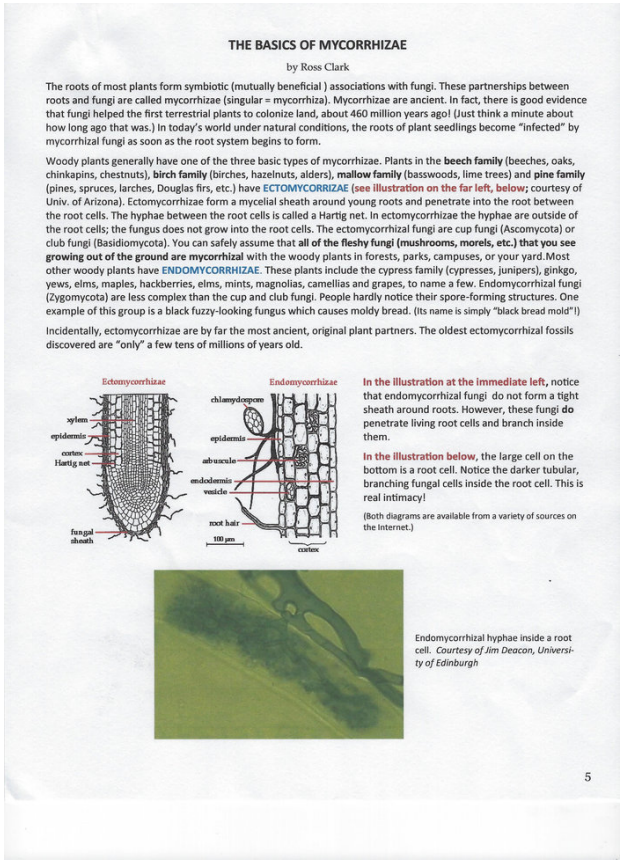
Many TBS members contributed to the success of the show. We all know that success of a show of this caliber is always a team effort, but a special thanks goes to Merritt Barnett for tirelessly working for weeks to prepare the show and for doing most of the heavy lifting between Friday and Sunday. Many thanks got his wife Debbie as well: she kept us very well fed on Saturday, when most volunteers couldn't leave the facility!

Due to unforeseen circumstances, we had to change our topic for the August 5th meeting. We couldn't secure a Master Gardener in time to come and join us for a conversation on Diseases. We will instead discuss carving, jin, and shari, a topic that is sure to be of interest to many.

This month we bring you a bit of education at the bottom of this newsletter: an in depth review of mycorrhizae and their role in plant physiology, as well as a brief introduction to fungi. Both articles are reproduced here with permission from the author.

Some other trees from the TBS show

The following articles by Rose Clark are reproduced with the author's permission. Fungi are both friends and foes of bonsai and success depends on the appreciation of their roles.



THE BASICS OF MYCORRHIZAE

by Ross Clark

The roots of most plants form symbiotic (mutually beneficial) associations with fungi. These partnerships between roots and fungi are called mycorrhizae (singular = mycorrhiza). Mycorrhizae are ancient. In fact, there is good evidence that fungi helped the first terrestrial plants to colonize land, about 460 million years ago! (Just think a minute about how long ago that was.) In today's world under natural conditions, the roots of plant seedlings become "infected" by mycorrhizal fungi as soon as the root system begins to form.

Woody plants generally have one of the three basic types of mycorrhizae. Plants in the **beech family** (beeches, oaks, chinkapins, chestnuts), **birch family** (birches, hazelnuts, alders), **mallow family** (basswoods, lime trees) and **pine family** (pines, spruces, larches, Douglas firs, etc.) have **ECTOMYCORRIZAE (see illustration on the far left, below;** courtesy of Univ. of Arizona). Ectomycorrhizae form a mycelial sheath around young roots and penetrate into the root between the root cells. The hyphae between the root cells is called a Hartig net. In ectomycorrhizae the hyphae are outside of the root cells; the fungus does not grow into the root cells. The ectomycorrhizal fungi are cup fungi (Ascomycota) or club fungi (Basidiomycota). You can safely assume that **all of the fleshy fungi (mushrooms, morels, etc.) that you see growing out of the ground are mycorrhizal** with the woody plants in forests, parks, campuses, or your yard.Most other woody plants have **ENDOMYCORRHIZAE**. These plants include the cypress family (cypresses, junipers), ginkgo, yews, elms, maples, hackberries, elms, mints, magnolias, camellias and grapes, to name a few. Endomycorrhizal fungi (Zygomycota) are less complex than the cup and club fungi. People hardly notice their spore-forming structures. One example of this group is a black fuzzy-looking fungus which causes moldy bread. (Its name is simply "black bread mold"!)

Incidentally, ectomycorrhizae are by far the most ancient, original plant partners. The oldest ectomycorrhizal fossils discovered are "only" a few tens of millions of years old.

In the illustration at the immediate left, notice that endomycorrhizal fungi do not form a tight sheath around roots. However, these fungi **do** penetrate living root cells and branch inside them.

In the illustration below, the large cell on the bottom is a root cell. Notice the darker tubular, branching fungal cells inside the root cell. This is real intimacy!

(Both diagrams are available from a variety of sources on the Internet.)

Endomycorrhizal hyphae inside a root cell. *Courtesy of Jim Deacon, University of Edinburgh*

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A **third main type of mycorrhiza is found only in the fine root systems of members of the heath family** (blueberries, azaleas, rhododendrons, heathers). These **ERICOID MYCORRHIZAE** include both endo- and ectomycorrhizal fungi, and are thought to make it possible for these plants to thrive in soils that are extremely low in nutrients. Ericoid mycorrhizae are usually favored by acid soil conditions.

Notice how extensive the fungi are in the **root cross section to the left**. A non-mycorrhizal root would not be so dark; instead, it would show many open spaces (root cells) and not have the extensive fungal fringe around the outside.

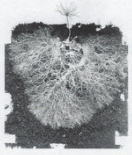
This extreme dependence on mycorrhizae could explain why some heath family members are difficult to grow, and why azalea cuttings sometimes remain chlorotic (= yellow) for a year or two, until mycorrhizae are well established.

Image courtesy of Wikipedia

There is another distinct type of mycorrhizal relationship, but it is found only in orchids. That's a different subject, for a different kind of newsletter . . .

FUNCTIONS OF MYCORRHIZAE

So much for the makeup and structure of mycorrhizae. **Both of the partners in a mycorrhizal arrangement benefit greatly from each other.** The fungal partner cannot make its own food, so it obtains food from the roots of the photosynthetic plant. (The fungus also obtains food from digesting leaves, dead roots, etc. in the soil.) The fungus partner increases the absorption capacity of the root, both by its incredibly extensive growth through the soil, and its ability to absorb certain critical nutrients, phosphorus in particular. The fungus also provides connections from plant to plant. There is some evidence, for example, that mature trees can affect the growth of seedlings through mycorrhizal connections. It is a mind-blowing idea, but all the trees in a natural forest are probably connected by an invisible network of fungi. It's a truly amazing concept.



A tiny seedling larch (top of image) and its associated mycorrhizal fungus. (An open source photo.)
Notice the incredibly extensive mycorrhizal fungus with this young larch tree seedling. Even if we didn't know it, we would certainly guess that the fungus is having a profound effect on the seedling. As the seedling gets older, it will be healthier and grow faster because of its association with the fungus.

We've known **what mycorrhizae basically do for cultivated plants** for some time. The website of Fred Davies of the Department of Horticultural Sciences at Texas A&M University (accessed Feb. 2016) is a good summary. In general, mycorrhizae provide the following benefits to plants:

Increased absorption of water and nutrients
Increased tolerance to drought [sometimes this is extreme, as in some heath family plants]
Increased resistance to diseases and pathogens
Increased resistance to other environmental stress factors
Increased growth of seedlings and cuttings [think about this if you do cuttings]
Decreased transplant shock

RELATED QUESTIONS

Do fungicides damage mycorrhizae? The short answer is yes; usually. According to **Mycorrhizal Applications, Inc.** (see their website), some fungicides affect mycorrhizal fungi more than others. Also, sometimes how much a mycorrhizal fungus is damaged by fungicides depends on whether the mycorrhiza is well-established or in an early stage, and most probably, on whether a single or multiple fungicides are used. With this in mind, **it certainly would be prudent to cover the soil in pots of plants you are spraying for fungi which are attacking the leaves**. It might also be a good idea to treat fungal problems only when they show up, instead of spraying preventively. Of course, if fungal diseases are already established in your bonsai operation, spraying only when problems show up probably may not be the best option.

By the way, it also has been shown experimentally that **high-nitrogen soil conditions can negatively affect mycorrhizae**. You might want to think about that when you decide how much fertilizer to give plants. Also, in general, chlorinated water is not beneficial for fungi. (In microbiology labs, a weak Clorox solution sometimes is used to kill fungal spores.)

Does it hurt mycorrhizae to wash all the soil away from roots? (See last month's newsletter article.) Roots associated with fungi do not encounter extensive root washing in nature, so it is logical to assume that washing roots clean does indeed set mycorrhizae back. We would expect that ectomycorrhizae would suffer more, since the fungus is more external. But as you can see from the illustration at the bottom of p. 5, endomycorrhizae are also partly external.

HELP!—There's a mushroom growing in my bonsai pot! Relax. If the mushroom is "rooted" in soil and not attached directly to your tree, and if the tree looks healthy, most likely a mushroom or two in a pot is simply a strong signal that the mycorrhizal fungi in the pot are doing very well. As soon as the mushroom cap(s) expands fully, you might want to break it up and put pieces of it in pots containing the same species of tree, so the spores can reinforce mycorrhizae of your other trees. It's a good idea to use rubber gloves or wash your hands after handling "wild" mushrooms, because many are poisonous.

What is the best source of active mycorrhizal fungus? By far the best source is highly organic soil just below the soil surface in a **forest where a tree of the target genus is growing**. For instance, for Japanese white pine growing on its own roots, steal a little soil from a natural forest where Eastern white pine is growing and insert it under the soil surface in Japanese white pine bonsai pots. If you collect samples in this way, refrigerate them until you use them.

A mushroom (Amanita; poisonous) . . . . . and its mycorrhizal association with roots. (Courtesy of Wikipedia)

Gleaming in moonlight
This ring of warty toadstools
Makes billions of spores rc

Editor's promise: A less complex newsletter next month!

(regional events, continued)

North Carolina Arboretum Bonsai Expo, weekend of Oct. 8-9, Asheville

Winter Silhouette Bonsai Exhibit, Dec. 3-4, Kannapolis, NC (northeast of Charlotte, near I-85)

Additional events and details will be posted in this newsletter as details become available

OTHER ANNOUNCEMENTS

Mycorrhizae (root-fungus relationships) often come up in bonsai conversation today. From conversations we've heard, most bonsai folks know that mycorrhizae are important , but don't really know that much about them. That's why we're devoting much of this month's newsletter to the subject.

Deadline for contributions to next month's GLBS newsletter is Friday, April 22.

SOME BASIC INFORMATION ABOUT FUNGI

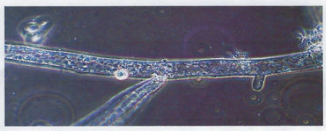
(so you can understand mycorrhizae better; see next article)

by Ross Clark

Have you ever seen a fungus? Well . . . maybe a mushroom? Actually, mushrooms are only a small part of a fungal organism. If you are standing near mushrooms, most of the body of the fungus remains invisible, in the ground, right under your feet. And if you are in a forest, everywhere you walk, underneath you is a vast interwoven network of fungi that extends throughout the upper soil and from plant to plant and tree to tree. It's mind-boggling. All this, and we only see a few mushrooms? Yes.

The reason for this strangeness is that terrestrial (land-dwelling) fungi are very unlike animals and plants. Except when they produce spores, fungi have no defined shape, like animals and plants do. A fungus "body" (technically called a **mycelium**) consists of a network of filament-like threads, called hyphae (singular = **hypha**). As fungi grow, they secrete enzymes that break down complex (carbon-containing) molecules into simple molecules. Then, the hyphae absorb the simpler molecules through the hyphal cell walls. **That's how fungi feed: they digest and absorb whatever they grow through**. And, as we all also know, when fungi break down the molecules of a plant or animal, the plant or animal rots. (Like your woodpile, the brown spots on peaches in your refrigerator, or tip blight on your junipers. . .) The fungi we usually hear about are disease-causing (pathogenic) fungi. There are many pathogenic fungi, but the majority of fungi feed on dead plant material. (Dead animals, on the other hand, are often recycled by bacteria.) **A few trees, such as ginkgos and bald cypresses have no significant fungal pathogens** and consequently their wood is highly rot-resistant.

Mycelium of a fungus (composed of many threadlike hyphae). Courtesy of Wikipedia.



A fungal hypha, highly magnified (Courtesy, Botany Dept., Univ. of Wisconsin)

If a mycelium becomes large enough, environmental factors often trigger it to form spore-forming structures. That's what mushrooms are: spore-forming structures. However, more often than not, fungi also form spores without forming a special structure. **Fungi produce incredible numbers of very tiny spores** that move from place to place in air and water. Spores and fragments of living mycelium also can be transported in soil, living plants, and even on the shoes of humans and the feet of waterfowl. That's why it's often hard to tell you have a fungus problem. We can't see the spores, and **the only way we know we have a pathogenic fungus problem is by seeing the symptoms.** (Examples pictured below).

So, if the only way that pathogenic fungi announce their presence is by causing a problem, we should be always on alert, watching our plants carefully.

By the way, **no one knows how many species of fungi there are**. The more recent estimates from scientists are basically educated guesses, but almost for sure there are hundreds of thousands. One reason it is so difficult to know how many species there are is that a single fungus species can look very different when it grows on different food sources. In addition to the relatively few species sometimes grow on bonsai, **many fungi benefit humans** by producing **food** (wine, bread and cheese, for example), **antibiotics** (penicillin), **drugs** (statins, conception control hormones) and **other useful products** (citric acid, omega-3 fatty acids). And together with bacteria, fungi are Nature's **decomposers and recyclers**, and form a variety of **symbiotic associations** with other organisms (lichens, mycorrhizae). (A stray thought: Just think of what the world might be like if nothing ever decomposed.) On the other hand, many fungi parasitize living organisms. And when they do that, they cause diseases. But that's a huge subject in itself. This article is already long enough.

Examples of fungal disease symptoms

Needle cast symptoms on pine needles. (Open source photo, apparently originally from Univ. of Georgia, USA.)

[oops . . .that's "powdery" mildew, not 'powery"

Leaf spot of maple (Courtesy of Mississippi Agricultural and Forestry Experiment Station)

TBS Bonsai Library
Borrow a book!

Link to the TBS LIBRARY (https://www.trianglebonsai.com/so/3MEJthZh/click?w=LS0tDQpiMTU1MTkxYS00ZmFlLTRiN2EtZjc1OC1iZjUzYTY3Mjc1NDkNCmh0dHBzOi8vd3d3LnRyaWFuZ2xlYm9uc2FpLmNvbS90YnMtbGlicmFyeS0yDQotLS0)