

Plants' Natural Friend

Mycorrhizal fungi—naturally occurring, beneficial soil organisms—have been helping farmers for thousands of years by improving water and nutrient use efficiency and suppressing diseases in the plants they colonize. Applying certain chemicals to the soil during the last half century—while increasing crop yields and fighting diseases—has likely inhibited these important fungi.

Agricultural Research Service plant pathologist Robert G. Linderman is one of only a few scientists studying how mycorrhizae affect the nutrition and health of nursery crops. Other ARS scientists look at the fungi in food crops.

At the Horticultural Crops Research Laboratory in Corvallis, Oregon, Linderman is investigating various factors that affect mycorrhizal relationships. He measures the level of mycorrhizal colonization of roots and compares it to control groups to see how effective various treatments are.

Linderman first looked at dozens of fertilizers on various nursery crops—particularly marigolds, because they are very responsive to mycorrhizae—to see whether they help or inhibit fungal growth. He found that organic fertilizers are generally compatible with mycorrhizae, whereas phosphorus-rich inorganic fertilizers inhibit the fungi.

“It’s good that organic fertilizers don’t inhibit mycorrhizae, but the plants do not grow as large or as fast as the ones treated with inorganic fertilizers,” Linderman explains. Manufacturers of organic fertilizers are now advising users to apply more than they were previously. This allows plants to grow normally without interfering with mycorrhizae.

Linderman is looking at other things growers add to their potting mixes. Peat moss has traditionally been a popular component in potting mixes. Linderman observed that some peat types suppress mycorrhizal associations, while others do not.

Instead of peat, some growers are starting to use coir (fibers from coconut) as a potting mix component. Coir has a more uniform texture than peat, and it has a better water-absorbing and nutrient-holding capacity. Linderman’s studies show that coir—like organic fertilizers—does not inhibit mycorrhizae, although it may reduce growth of some plants.

Linderman is researching composts that might be added to potting mixes. Composts differ in the types of materials they contain. Nurseries in different parts of the country also use different amounts of compost in their media. Even the way compost is made and stored makes a big difference. “Overall, presumably because of the high levels of phosphorus, fresh composts appear to suppress mycorrhizae,” Linderman says. But some very mature composts are not inhibitory.

Linderman admits he has not settled on the one perfect ingredient to add to potting mixes that will establish mycorrhizae

PEGGY GREB (K11068-1)



To determine the effects of compost on mycorrhizae in greenhouse production of nursery crops, plant pathologist Robert Linderman and technician Anne Davis grow plants (marigolds shown here) in a potting mix with various levels of compost. Some plants are inoculated with mycorrhizal fungi and others are not. Compost was added to the larger plant that Linderman is holding (left) while none was added to the smaller plant.

in nursery crops and produce healthy plants. “Growers just need to think ahead of time what will happen when a particular product is used, since they wouldn’t want to add an ingredient that would suppress the beneficial fungi.”—By **David Elstein**, ARS.

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