

### Myconate for the Stimulation of Native Mycorrhizal Fungi

Myconate contains the biologically active isoflavone formononetin which is a natural signaling compound. The formononetin in Myconate is well documented for its ability to stimulate the colonization of mycorrhizal fungi, it has been shown to increase the rate and extent of VAM (Vesicular-Arbuscular Mycorrhizal) fungal colonization. Spore germination, growth direction and rate of VAM are all affected. Most soils have an ample supply of mycorrhizae and Myconate facilitates their germination and draws these beneficial organisms to the crops roots effectively and rapidly.

### Temperature and VAM

The effects of temperature on the rate and extent of root colonization are complex, the responses varying with both fungus and plant (Smith and Read, 2008). The ability to form mycorrhizas at low temperatures may be related to adaptation of some fungi to the climatic conditions prevailing where they originated. (Hamel and Plenchette, 2007).

The scientific literature contains reports of root colonization of bluebells by VAM fungi at soil temperatures as low as 41°F (5°C) (Daft et al, 1980). However, in one reported case involving soybean and sorghum, VAM colonization was strongly repressed at 59°F (15°C) (Zhang et al, 1995), and completely inhibited in barley at 50°F (10°C) (Baon et al, 1994). In experimental systems, there is usually an increase in percent colonization between 50°F and 86°F (10°C and 30°C). (Note that these are soil temperatures, not air temperatures.)

### Soil Temperatures Effect on Formononetin

Formononetin is a very stable material that will remain viable under cool dry conditions for long periods of time and photodegrade slowly on the soil surface. Once the soil temperatures are warm & moist enough for biological activity, formononetin in the soil will begin to release signals to the mycorrhizae in the soil, directing their movement to the roots. The half-life under biological active conditions is @ 14 days.

### Effect of Soil Temperature on Root Colonization by Mycorrhizal Fungi

The formononetin in Myconate stimulates mycorrhizal fungi for landscape or agriculture must be treated differently compared to traditional fertilizers. Since you are attempting to stimulate or hasten *living* organisms in the root zone, you need to consider the life cycle and soil temperatures that may affect the application. This technical bulletin discusses the temperatures that will promote or inhibit mycorrhizal development. Since

mycorrhizas form in soil, the temperatures we are dealing with are *soil temperatures*, not air temperatures. In summer, forest soil tends to be much cooler than the air, whereas in winter, the soil is usually much warmer than the air.

### Soil Temperatures for Mycorrhizal Activity

In light of the variability observed regarding VAM response to soil temperatures, what are the appropriate soil temperatures for successful stimulation of agricultural crops relying VAM fungi? There are significant variations, but generally, for optimum VAM colonization, soil temperatures should exceed 50°F (10°C). Setting this range as our optimum, one should avoid applications in soils where the temperature is below 45°F (7°C) unless the temperatures are on the increase toward a higher range and active plant growth within a reasonable time frame (4 weeks or less). Below that, many VAM fungi will not efficiently colonize roots. Be careful here. We are not suggesting that lower temperatures kill VAM fungi. That is not true, although VAM spores do die off rapidly after repeated exposures to freezing conditions (Kernan et al, 2000). Here we are saying that the ability of VAM spores and other propagules to colonize roots is significantly slowed, and can be halted at low temperatures.

***Once colonization is complete, however, mycorrhizal fungi survive throughout the winter within the root tissue of perennial host plants.***

### Seasonal Guidelines for Myconate Use in Temperate Climates

**Spring:** Apply Myconate when soil temperatures are above 45°F (7°C). In the spring, temperatures will be on the increase toward the preferred range above 50°F (10°C).

**Summer and Early Fall:** Soil temperatures in temperate zones should be good for Myconate use all summer long and through the early fall.

**Late Fall:** Do not apply Myconate when soil temperatures drop below 50°F (10°C). In the fall, temperatures will be on the decrease away from the preferred range. It is better to wait until soil warms again in spring.

**Winter:** Avoid application of Myconate in cold soils. Winter is not a good time for Myconate treatments in temperate environments.

**Always read and follow label instructions before using this product.**

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## Literature Cited

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