

# **EVALUATING MYCONATE TO STIMULANT NATURAL MYCORRHIZAE IN SOIL TO DECREASE CORN PLANT STRESS AND INCREASE YIELD**

**Paul Miksch, Cooperator (2006)**

**Joe D. Janak, Jr., Sam Womble, Stephen Biles, Dr. Tom Isakeit, Dr. Roy Parker  
County Extension Agent - Ag/NR, County Extension Agent - NR, Calhoun, Refugio  
& Victoria Extension IPM Agent, Extension Pathologist, Extension Entomologist,  
respectively  
Victoria County**

## **SUMMARY:**

Native mycorrhizae were found in the soil in this demonstration in Victoria County but were reported to be at low numbers; 10 – 20 spores per gram of soil. Stimulating the native mycorrhizae with Myconate did not show to increase mycorrhizae vesicles or spores or affect plant height, plant population, harvesting seed moisture, bushel weight or corn yield.

## **OBJECTIVE:**

To determine if native mycorrhizal fungi are present and if they play a role in normal crop production. To determine if native mycorrhizal fungi can be stimulated to grow and enhance plant production and crop yield.

According to Plant Health Care Inc. “Myconate, the potassium salt of formononetin, is a naturally occurring compound discovered in plant roots, which stimulates the natural growth of vesicular arbuscular mycorrhizae (VAM), thereby enhancing the growth of many plant species. Mycorrhizal fungi form symbiotic associations with plant roots in the majority of terrestrial habitats and with approximately 85 % of all plants on the earth, including most agriculturally important crops. VAM fungi can have profound beneficial effects on plant growth, yields, nutrition, and tolerance to both abiotic and biotic stress.”

## **MATERIALS and METHODS:**

Corn hybrid BH 9011RR was planted March 14, 2006 at the rate of 21,000 seeds/acre. The hybrid was planted on 38 inch centers with a John Deere 7100 planter. The previous crop was soybeans.

Fertilizer applied included 486 lbs/a of 25-5-0 applied in December 2005. The seed was treated with Poncho 250. Herbicides applied at planting included a banded application of 1 qt/a of MicroTech and 1 pt/a of Atrazine. The plots were sprayed with 1 pt/a of Roundup Original Max and 0.25 % Request on May 2, 2006.

At planting time, soil samples were collected from the top six inches of soil. Two soil samples were sent to Plant Health Care Inc. in Pittsburgh, Pennsylvania for counting native mycorrhizae in the demonstration area and another soil sample was sent to Texas A&M University Soil Testing Laboratory for nutrient analysis and recommendations.

Myconate treated plots were about 0.8 acres in size. Plots were 12 rows wide planted in 38 inch rows and approximately 1370 feet long. Four different Myconate treatments replicated three times were applied to this test plot including:

- 1) Control Treatment: BH 9011RR seed planted with a starter fertilizer of 50 lbs/a of 9-30-0 fertilizer (4.8 gal/a) applied in-furrow at planting.
- 2) BH 9011RR seed planted with 30 gm/a of Myconate mixed with 4.8 gal/a of water applied in-furrow at planting.
- 3) BH 9011RR seed planted with 30 gm/a of Myconate mixed with a starter fertilizer of 50 lbs/a of 9-30-0 fertilizer (4.8 gal/a) applied in-furrow at planting.
- 4) BH 9011RR Myconate treated seed (by Sub-Sahara International, Inc.) at the rate of 30 gm per 6 pounds of seed (30 gm/a) with a starter fertilizer of 50 lbs/a of 9-30-0 fertilizer (4.8 gal/a) applied in-furrow at planting.

About 2 weeks prior to harvest 4 corn plants per treatment were dug up with a shovel and fine roots were collected. The roots were washed to remove soil, cut into one-quarter inch pieces, and soaked in 10% KOH for 24 hours. After 24 hours, the root samples were rinsed with water and soaked in 0.01% HCl for 15-20 minutes, rinsed again, and stained in 0.5% aniline blue in Lacto glycerol (875ml lactic acid, 63ml glycerol, 63ml distilled water) for 1-2 hours. Again, the roots were rinsed and soaked in Lacto glycerol for a permanent storage stage. Samples of roots were taken from each treatment to create 3 microscopic slides per treatment and vesicles within a defined area were counted using a microscope to assess colonization of mycorrhizae.

Plant stand populations and plant height were recorded in four and two locations respectively within each treatment. Harvest of the treatments occurred on August 18, 2006 with a combine harvesting 8 of the 12 rows following the same row pattern throughout the field.

## **RESULTS and DISCUSSIONS:**

Rainfall from November, 2005 through spring of 2006 was nearly inexistent and the county was experiencing a drought. Soil moisture was fair at planting due to a recent rain although subsoil moisture was minimal.

In the mixing of the Myconate with the liquid fertilizer for application, there was a problem mixing the Myconate powder thoroughly and even when thoroughly mixed, it did segregate out and did plug up all of the 40 mesh screens in the fertilizer applicator hoses. Hoses were blowing off due to pressure caused by plugged screens. With the screens removed, the fertilizer and Myconate solution did go through the system and was applied to all plots.

Evaluated on June 14, 2006 and at harvest, there were no noticeable differences between the treatments. The extended drought and delayed summer rains did not have a beneficial effect and the crop suffered due to drought stress.

The two soil samples sent to Plant Health Care Inc. in Pittsburgh, Pennsylvania for counting native mycorrhizae returned with 10 and 20 spores per gram of soil. According to Dr. Don H. Marx, Chief Scientist of Plant Health Care, Inc., these results fell close to the lowest twenty percent of the 60 soil samples from throughout the United States the lab has tested this year. The average is 40 spores per gram and some in Wisconsin soils it exceeded 140 spores per gram.

Soil samples sent to Texas A&M University Soil Testing Laboratory requesting fertility levels for 150 – 200 bu/a recommended the following: 190-35-0 plus 2.4 tons/a limestone.

There were no differences in any agronomic characteristic including yield of the corn as related to the various Myconate treatments or compared to the untreated check. See Table 1 for complete results.

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**DISCLAIMER CLAUSE:**

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Table 1. Myconate treated corn crop and its effect on root colonization, agronomic characteristics and yield. Paul Miksch, Cooperator, Victoria County, Texas 2006.

TREATMENT	MYCOR-R HIZAE VESICLES <small>a/ b/</small>	PLANT HEIGHT INCHES	PLANT STAND 1000/A	% MOIS- TURE	BUSHEL WEIGHT LBS/BU	YIELD BU/A
Check with starter fertilizer	13.5	53	15.3	14.7	55.5	25.5
Myconate in furrow with water	15.9	49	15.8	15.9	54.8	23.8
Myconate in furrow with starter fertilizer	16.1	50	15.2	15.1	55.5	24.3
Myconate treated seed	14.4	53	14.3	15.3	56.0	26.9
		0.35	1.22	1.55	1.01	8.43
		0.22	0.76	0.97	0.63	5.27
		5.09	5.04	6.36	1.13	21.09
		0.2493	0.1138	0.4340	0.1097	0.8507

a/ Mycorrhizae vesicles counted on slides made from corn roots to determine mycorrhizal growth and colonization.

b/ Means within a data column followed by the same letter are not significantly different by ANOVA (P = 5 %; LSD).