ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
COOPERATIVE EXTENSION

AZ1582

August 2012

GUIDELINES FOR USING NON-TRADITIONAL SOIL ADDITIVES

Guangyao (Sam) Wang, Shawna Loper, Kurt Nolte, and Mike Ottman

Agricultural producers are often approached by salespeople who claim their soil additives could improve the current production systems. Pictures and graphs are typically presented showing significant yield benefits or soil improvements, along with testimonials. The cost per acre for these products is normally low and the reputed benefits great, so it is often tempting to try these products. While some of these products are legitimate and can improve crop production, the benefits from many of these products have not been proven scientifically by independent research (McFarland et al., 1998). Sometimes crop yield can be reduced by some soil additives (Bauder, 1976), but often, no positive or negative effect can be substantiated. Therefore, be very cautious before making a decision to use these products.

Soil additives are different from traditional fertilizers and soil amendments in that they usually have little or no nutrient content. There is no requirement for these products to have a guaranteed analysis label. Many of these products state on the label that they are not a substitute for a fertilizer program, but enhance the effectiveness of fertilizer normally applied or make nutrients in the soil more available to the crop. They are claimed to improve soil physical, chemical, and biological properties to improve nutrient and/or water availability in the soil and increase crop nutrient uptake.

Most soil additives on the market can be categorized into three main groups: soil conditioners, soil activators or biological inoculants, and wetting agents (McFarland et al., 1998). Soil conditioners are non-traditional soil amendments (such as mined mineral deposits) that are used to improve soil physical and/or chemical conditions (Mahler, 2008; McFarland et al., 1998; Hickman and Whitney, 1984; Bauder, 1976). Soil activators include micro-organisms and/or materials that inoculate the soil with beneficial organisms and stimulate existing soil microbes. Wetting agents and surfactants are used to reduce soil compaction, improve water infiltration and retention, and increase nutrient availability (McFarland et al., 1998). Some soil additives are legitimate and can increase crop production (for example, inoculants to increase N fixation by legume crops). However, among the 75 new products that appear on the market and are supposed to increase crop production in every year, about three quarters of these products have marginal or no value (Mahler, 2008). Detailed summaries and research reports on many of these products can be found in Lawless et al. (1984) and Hall and Sullivan (2001).

While traditional soil amendments and commercial fertilizers have been tested extensively through research trials, many soil additives are not tested independently. When approached to use these products, a good question to ask is if data are available from replicated field trials (Lawless et al., 1984; Downer, 2011). If research data are available, ask the researchers if the similar results would be obtained for your growing conditions. In many cases, products work in some conditions but not others (Sunderman, 1982).

Whether or not a product is beneficial may be deduced by using common sense. If a product is reported to increase soil microbial populations, humic/fulvic acid content, or certain soil nutrients, compare the amount of the products you are adding with the level that is already in the soil. The amount of a particular constituent added in the product may be so small compared to the amount in the soil that the product is unlikely to have an impact on soil properties or increase crop production. This is especially true for many soil activator products since it is difficult to change large, balanced, and resistant soil microbial populations with a small amount of microbes and organic materials (an acre of soil typically contains between 10 and 100 million billion bacteria!). A nutrient analysis of your soil is often helpful in determining the fertility status of your soil and if a particular product may be effective.

The local Cooperative Extension office may have information about these products. Extension or university personnel may have tested the product in question or something similar. Since there are so many products on the market, it is difficult for Extension personnel and university researchers to test all the products. Nevertheless, Extension agents and specialists may still be able to give you some information based on their experiences with similar products.

If information on the product is not available from Cooperative Extension offices and the product seems irresistible, ask the company to provide some of the product at no cost for the purpose of your own testing. Apply the product in several test strips and compare the treated strips to the untreated portions of the field. Harvest the strips and compare the yields in treated and non-treated areas. Test the product in fields with different soil fertility level and/or soil properties, since the product may work differently depending on the fertility status and soil properties of the soil (Sunderman, 1982). Test the product over multiple years before it is routinely used in the farm because a high degree of repeatability is often needed to receive economic benefits consistently. It is also worth checking if conventional soil additives and fertilizers have similar effects with lower costs.

The bottom line is: these products should be tested by either university personnel or yourself before using them to a large extent on your farms.

References and reading materials

Bauder, J.W. 1976. Soil conditioners - a problem or a solution? North Dakota Agricultural Experiment Station. Reprint No. 869. *Farm Research*. 33:21-24. **http://library.ndsu.edu/tools/dspace/load/?file=/repository/bitstream/handle/10365/9745/farm_33_04_05.pdf**

Downer, J. 2011. Snake oil, horticultural myths, urban horticultural legends, frauds and carpetgaggers in our industry. University of California Cooperative Extension. **http://ceventura.ucdavis.edu/Environmental_Horticulture/Landscape/Problems/Snake_oil/**

Hall, B. and P. Sullivan. 2001. Alternative soil amendments. National Sustainable Agriculture Information Center. **http://www.plant-trees.org/resources/infomaterials/english/agroforestry_technologies/Alternative%20Soil%20Amendments.pdf**

Hickman, J.S. and D.A. Whitney. 1984. Soil conditioners. North Central Regional Extension Publication 295. **http://www.ksre.ksu.edu/library/CRPSL2/ncr295.pdf**

Lawless, J. R., H.D. Sunderman, F. L. Lamm and L.D. Robertson. 1984. Compendium of research reports on use of non-traditional materials for crop production. NCR-103 Committee. Iowa State Press, Ames, Iowa. **http://extension.agron.iastate.edu/compendium/**

Mahler, B. 2008. Don't get bitten by snake oils. University of Idaho Nursery Technical Resource Center. **http://www.extension.uidaho.edu/nutrient/pdf/NutrientDigestNewsletterFall2008.pdf**

McFarland, M.L., C. Stichler and R.G. Lemon. 1998. Non-traditional soil additives: can they improve crop production? Texas Agricultural Extension Service. **http://forages.tamu.edu/PDF/Alternative.pdf**

Sunderman, H.D. 1982. Soil wetting agents: their use in crop production. **http://www.extension.umn.edu/nutrient-management/Docs/NCREP-190-1.pdf**

College of Agriculture and Life Sciences
Arizona Cooperative Extension

The University of Arizona
College of Agriculture and Life Sciences
Tucson, Arizona 85721

Guangyao (Sam) Wang
Assistant Specialist, Plant Sciences

Shawna Loper
Assistant Area Agent, Agriculture

Kurt Nolte
Yuma County Extension Director/Area Agent & Director, Yuma Agricultural Center

Mike Ottman
Agronomy Specialist

Contact:
Guangyao (Sam) Wang
samwang@cals.arizona.edu

This information has been reviewed by University faculty.
cals.arizona.edu/pubs/crops/az1582.pdf

Other titles from Arizona Cooperative Extension can be found at:
cals.arizona.edu/pubs