Idaho Crops & Soils News

A newsletter for Idaho crop producers

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The goal of this monthly newsletter is to serve the best interests of Idaho crop producers. Correspondence and inquiries should be addressed to: Olga Walsh, Cropping Systems Extension Specialist, Southwest Research and Extension Center, 29603 U of I Lane, Parma, ID 83660, Phone: (208)722-6701 (ext. 218), Fax: (208)722-6708, **Email:** owalsh@uidaho.edu)

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WHAT'S NEW?

Far West Agribusiness Association – Winter Conference – Jan 13-14, Twin Falls

The focus was largely on sustainability, economic profitability and technology at the Far West Agribusiness Association winter conference in Twin Falls.

The talks on precision water and nitrogen management in crop production was well attended. Sixty learners participated in discussion about determining crops' yield potential and applying inputs such as water and nutrients according to plant needs. For nitrogen fertilizer, the difference between two approaches were discussed: yield goal and yield potential.

While the yield goal approach entails basing nitrogen recommendations from the historical yield data, the yield potential approach means utilizing in-season crop and environmental data to project yield potential and estimate response to addition of fertilizer. The yield potential methodology capitalizes on the idea that higher efficiency can be achieved if spatial and temporal variability is addressed.

For water management, the importance of conserving irrigation water was discussed, various irrigation systems were contrasted in terms of their efficiency of water use. Recent research results from a study conducted at two locations in southwest Idaho showed that the amount of irrigation water can be reduced by 25% without decreasing wheat yields or quality.

Unmanned aerial vehicles (UAVs) – or drones – were discussed at two sessions. Sixty attendees of these sessions learned about potential uses of UAVs for crop monitoring, current safety guidelines, the process of registering UAVs with the FAA and future potential developments for drones in agriculture.

Western Idaho Ag Show - Jan 26-27, 2016 -

Caldwell, Idaho, Caldwell Events Center

This event showcases product from Agriculture & Forestry, Hand, Machine & Garden Tools, Horticulture & Floriculture industries etc. in the Business Services industry.

Two presentations covering ***"Best Management Practices for Sustainable Crop Production"*** will be

delivered each morning. Extension materials will be distributed to attendees.

For information - please call (208)939-6426 ext 29 for David Beale.

GUEST CONTRIBUTION

-by **Jim Ippolito**, with **Jonah Levine**, **Morgan Williams**

Jim Ippolito, Research Soil Scientist, USDA-ARS-Northwest Irrigation and Soils Research Laboratory, Kimberly.
Jonah Levine, Biochar production line manager at Confluence Energy in Kremmling, CO.
Morgan Williams, Ph.D. candidate at the University of California, Berkeley.

Biochar is a carbon-enriched product created when biomass (such as wood and agricultural wastes, manures, etc.) is pyrolyzed (heated in a low or no oxygen environment) at temperatures generally less than 1300ºF; the end-product appears similar to charcoal. Recently, a great deal of research attention has focused on using biochar as a soil amendment to address agricultural issues related to climate change.

One major climate change issue is the potential to improve soil water relations in light of changing future precipitation patterns or reductions in water availability in drier portions of the world (such as the western US); it appears that biochar may play a positive role. It has been hypothesized that the large surface area and porosity of biochar, along with reductions in soil bulk density, could improve soil water relations (Bruun et al., 2012). If biochar increases the soil water holding capacity, this may mean that more water could be available for plants for longer periods of time. Biochar might be able to lengthen times between irrigation events in areas requiring supplemental irrigation for crop growth.

Scientists in the western U.S. have shown that adding as little as 0.4% by weight (~ 4 tons/acre incorporated to a 6" depth) could improve soil water relations (Streubel et al., 2011). In a laboratory incubation study, Novak et al. (2012) added 2% biochar by weight (~ 20 tons/acre) to two western US soils and showed that the soil water holding capacity increased by between 3 to 7%. The results lasted for at least 127 days (the study length). Based on the evapotranspiration rates at the two site locations, the length of time between irrigation events could potentially be extended by between 0.5 and 2.5 days depending on cropping season time. However, others have shown that greater biochar application rates (e.g., between 2 and 10% by weight; ~ 20 to 100 tons/acre) may be necessary in some soils (Ippolito et al., 2014) with positive changes lasting for at least a year (the study length).

Differences in these studies could be related to soil properties such as texture.

Biochar after being pyrolyzed.

In order to further understand the role biochar may play in terms of soil moisture relations in soils of various texture, a laboratory demonstration (no replication) and a pot study was conducted. The laboratory demonstration used a sand and a silt loam soil (both from ID), and clay loam soil (from CA) soil that received lodgepole pine biochar at 0, 5, or 10% by volume (~ 50 or 100 tons/acre). Soil-biochar treatments were evenly mixed and placed into containers, volumetric moisture sensors (Decagon GS-3 with EM-59 data loggers) were inserted, the soils were saturated with water, and then moisture measurements were recorded over a 14 day drying period. The control soils always contained less volumetric water than soils receiving biochar regardless of soil texture. Furthermore, when biochar was applied at 5 or 10%, the volumetric water contents were 31 and 41% (sand), 16 and 18% (silt loam), and 15 to 18% (clay loam) greater than the control soil.

A replicated (n=4) four-month pot study was conducted to study the effects of increasing pinyon pine or juniper biochar application rates (0, 1, 2, and 5% by weight; ~ 0, 10, 20, and 50 tons/acre) on soil moisture content in a sandy loam, loam, or silt loam soil (all from NV).

Biochars were thoroughly mixed into the soils, the mixtures placed in pots, and the pots kept at 80% of field capacity by watering twice per week with water. At the end of four months, gravimetric soil water content and bulk density were determined, and volumetric soil water content was calculated. Both biochars acted similarly to one another, thus the data was combined. Supporting the demonstration project findings, the control soils almost always contained less volumetric water than soils receiving biochar regardless of soil texture (Figure 1). When biochar was applied at 1, 2, or 5%, the volumetric water contents were between 15 and 20% (sand), 2 and 10% (loam), and 5 and 7% (silt loam) greater than the control soil.

Improvements in soil water content via biochar application may be of value to arid region crop producers, producers in areas where precipitation events are variable and lacking over relatively long time periods, or for specialty crop producers where irrigation water is expensive; this may be especially true in coarser-textured soils. Current estimates for biochar costs range from $200 to $500/ton (Kulyk, 2012). It is important to note that a single biochar application may provide long-term improvements in soil water content and a potential reduction in irrigation costs (Spokas et al., 2012), allowing the to be amortized over several years.

Further research is needed to verify this suggestion.

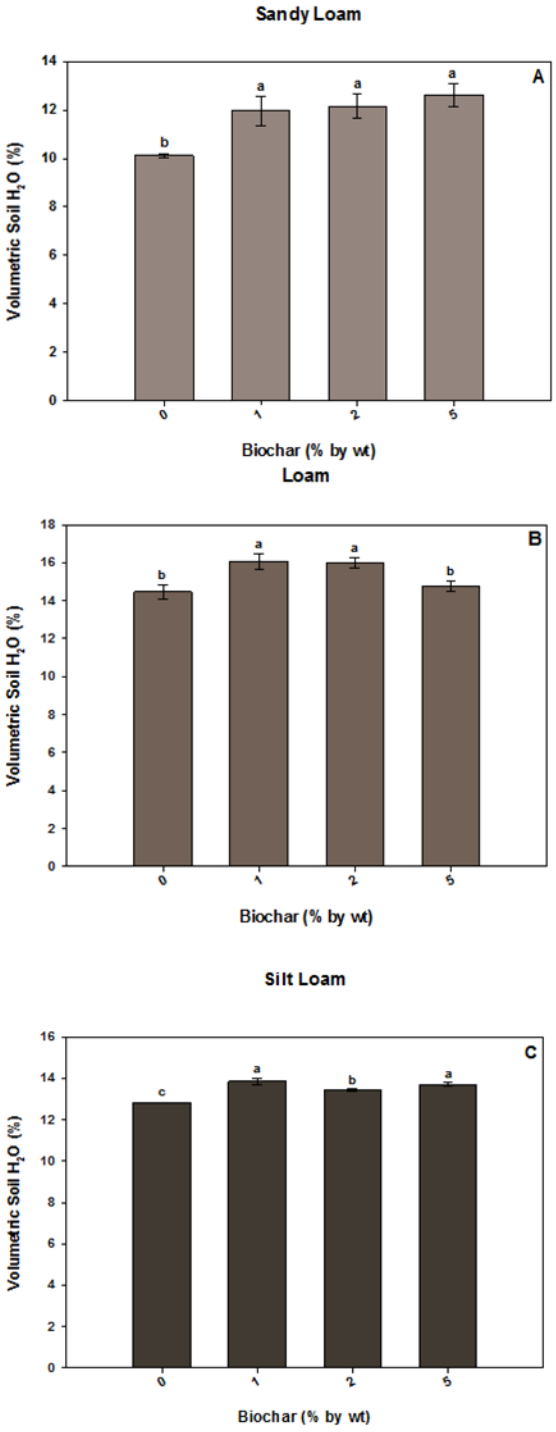

Figure 1. *Volumetric water content of the A) sandy loam, B) loam, and C) silt loam Nevada soils containing 0, 1, 2, or 5% pinyon pine and juniper biochar following four months of incubation at 80% of field capacity.*

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Best Western Plus Caldwell Inn & Suites
908 Specht Avenue, Caldwell, ID 83605
February 9, 2016 8:00 am – 1:00 pm
Cost: $20

Soil & Water Management: 0.5 credits
Integrated Pest Management: 1 credits
Crop Management: 2.5 credits

Host: Olga Walsh, University of Idaho, Parma Research & Extension Center, owalsh@uidaho.edu, (208)722-6701